

The MIT Faculty Newsletter

Vol. V No. 1

September 1992

What Can We Do About The Freshman Year?

Hartley Rogers, Jr.

MIT has many educational successes to its credit. As a university emphasizing science and engineering, with a single department-based faculty, MIT has maintained an atmosphere of responsive and forward-looking educational ferment. For the most part, departments have had a firm and confident sense of their educational and research missions and of their responsibilities to students and to wider academic and professional communities. They have worked creatively and productively on the content and format

**Special Section:
The Freshman Year**
Williams, Smith, Orme-
Johnson, Behnke
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of departmental programs. In addition, recent decades have witnessed a variety of beneficial, Institute-wide innovations, both large and small. The most prominent of these, perhaps, is UROP.

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Freshmen: Give Them More Responsibility For Learning

Vernon M. Ingram

At the end of the year a freshman wrote "I came from a school where I had classes of 4 or 7 people. Twenty at the most. Classes in an auditorium, with students numbering in the hundreds and the teacher wearing a microphone, were unsettling to me. I had trouble concentrating and was always distracted by the people talking in front of me, so I stopped going. Maybe that was a mistake, but I honestly don't think I would have done better if I had kept going. I just couldn't get what I was supposed to in a class of over 400 people."

Freshmen have now arrived, still looking somewhat lost. How many will have the same reaction as the writer when they get into the usual large first-year lecture courses? Is this really the best way to teach the most carefully recruited, highly gifted group of students? There are many first-year students who are ready in terms of motivation and knowledge to learn the science core subjects more independently.

I would like to have MIT recognize the amazing quality of its entering students

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MIT Academic Computing Solar Sails, Computer Classrooms, and More

Gregory A. Jackson

The left-hand side of my workstation screen typically displays a wide-open Zephyr instance called "help" – "Zephyr" being MIT's instant-messaging system, and "instances" the arbitrary categories for publishing and subscribing to Zephyrgrams. (Zephyrgrams, by the way, can appear on Athena workstations or on networked Macintoshes, and soon they will appear on networked DOS computers as well.) Anyone looking for help on anything can send a Zephyrgram labeled "help" with a query, and anyone who's chosen to see "help" Zephyrgrams can answer it. As is true elsewhere around the Institute, some answers are right, and some are less right.

This day there was the normal stream of questions about C, Athena policy, printing, and telephone numbers. Then a different question popped up: "How do you tack a solar sailboat toward the Sun?"

"You can't," came an immediate response. "By getting the vectors right," came another. "Can't" then pointed out that "getting the vectors right" had

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David Lewis
Managing Editor

Address: MIT Faculty Newsletter, MIT Bldg. 38-160
Cambridge, MA 02139; (617) 253-7303.

E-Mail: fnl@zeiss.mit.edu.
FAX: 617-253-0458

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Authors

Michael C. Behnke is Director of Admissions.
Jeanne A. Cavanaugh is Manager, Training and Publication Services.
Herman Feshbach is Institute Professor Emeritus.
Vernon M. Ingram is Professor of Biology.
Gregory A. Jackson is Director of Academic Computing.
Travis Merritt is Head, Undergraduate Academic Affairs Office; Chair of the MIT Colloquia.
William H. Orme-Johnson is Professor of Chemistry; Housemaster of Bexley Hall.
Hartley Rogers, Jr. is Professor of Mathematics.
Arthur C. Smith is Dean for Undergraduate Education and Student Affairs.
J. Kim Vandiver is Professor of Ocean Engineering; Faculty Chair.
Rosalind Williams is Associate Professor of Writing and Technology Studies; Associate Chair of the Faculty.

Editorial**Coherent Philosophy and Consensus
Needed for Freshman Year**

There is much that is good about the current academic aspects of the freshman year. Many excellent faculty have devoted time and effort to creating and teaching a variety of formats for basic math and physics suitable for different backgrounds and interests. There is also much excellent teaching in the chemistry, biology, and HASS subjects. Most freshmen (about 750 out of 1147) now enroll in 127 Freshman Advisor Seminars that offer intimate, direct contact between freshmen and faculty. The so-called alternate first-year programs – Concourse, ESG, and ISP – are also very successful. As a result, for many students the freshman experience is challenging and rewarding, and leads to successful upperclass years and subsequent careers.

We have solved a number of freshman-year problems and used the freshman year to solve a number of others. But we have done this on an *ad hoc* basis and have not considered the totality of our educational goals. Perhaps, almost certainly, we can do better if we develop a coherent philosophy. There are a number of issues to consider.

Many concerns involving calendars and curriculum were voiced during the discussion leading up to adoption of the GIR in biology. There are questions of student self-imposed rigidity in fulfilling the GIRs. Over half the 1992 entering class (533 of 1049) placed out of one or more non-HASS subjects, many of them GIRs; and an additional 42 had college-level transfer credit. Are they really better off than the fully MIT-trained freshmen? Other subjects, such as computing, have been suggested for GIRs. There has been a considerable drop in freshmen enrolled in foreign language subjects, especially in

beginning and intermediate subjects. This is an unfortunate trend in this day of the “global village.” There is also concern about more careful selection of HASS subjects, as first steps toward a possible minor or even a (second) major in these areas.

Last year President Vest appointed a committee to review the calendar. As

changes). However, it can be expected that these departmental changes will raise new questions and requirements concerning the freshman year. Indeed, some faculty are urging that there should be first-year subjects specifically intended for students with a potential interest in engineering. The aim of such subjects, which are now being introduced

Achieving clarity of objectives should be at the heart of all discussions concerning the freshman year.

discussed in this issue’s article by the chair of the faculty (p. 5) a final report will be made this fall. Various committees also gave much thoughtful attention to the questions concerning the GIRs, and how these questions might best be addressed. As a result, these issues will become the primary agenda item for the newly reconstituted Committee on Undergraduate Policy. (See the articles by Rosalind Williams, p. 6, and Arthur Smith, p. 8.)

The ongoing, nationwide debate about engineering education will influence the structure and content of the first year. President Vest, speaking to this year’s annual convention of the American Society for Engineering Education, said “...engineering education must now return closer to the roots of engineering practice” and that “Our students need more exposure to the integrative aspects of engineering design and practice....”

Major changes will occur in the upper level curricula of engineering departments (and almost all, if not all departments are already making

into curricula at several major universities, would be to expose students to the scope and nature of the engineering profession, and to begin challenging them with open-ended problems.

As indicated in several of the articles in this *Newsletter*, there are serious concerns among the faculty about the style and pace of the freshman year. The effectiveness of large lecture classes is questioned. Many participants at a CUP workshop in January felt the freshman year needs not just improvement, but radical change. For many freshmen, life at MIT apparently is a constant, frantic effort to complete the next problem set or to study (usually at the last minute) for the next quiz. (William Orme-Johnson [p. 10] writes eloquently on this characterization, from the viewpoint of a housemaster.) There are faculty who fear that students have or take no time to connect what they are learning in different subjects. (Yet there are others who suggest that this style and pace are appropriate training for a lifetime of
(Continued on next page)

Coherent Philosophy Needed for Freshman Year

(Continued from preceding page)

organizing time and meeting deadlines.)

Vernon Ingram's article (p. 1) outlines a very different style and pace, based upon a recognition of "...the amazing quality of...entering students by trusting them to shoulder much more of the responsibility for learning." Hartley Rogers (p. 1), Rosalind Williams, and Arthur Smith have also argued for flexibility, diversity, and increased student participation in shaping their studies. The first year is identified as a year of transition, where the problem is the failure to inspire certain attitudes toward learning and toward life. Certainly there is much to be learned from the popularity and apparent success of the Freshman Advisor Seminars. Many of these seminars are now being offered by faculty from engineering and science departments who have not been otherwise involved in the freshman curriculum. Perhaps it is high time to replace the passive-resistance metaphor of "drinking from the fire hose" with an image of active engagement, with varied pathways through the requirements.

In the final analysis (as is emphasized by Hartley Rogers), decisions about the nature of the freshman year must be based upon a consensus concerning the objectives for this year. At the risk of some oversimplification, two quite different objectives can be identified.

One possible objective is to provide students with the fundamental knowledge and with the methodological tools needed for study in departmentally-offered subjects in subsequent years. Oft-heard complaints suggest that the system is not working in this area. Faculty teaching second-year subjects in engineering departments observe that students have learned neither the math nor physics that are needed for their subjects. Perhaps this situation is partly the result of style and pace. We expect

our first year students to learn much. There is anecdotal evidence that students tend to study only for the next problem set or quiz, almost as though there will never be need to use this knowledge again.

An alternate objective might be to provide the basic understanding of science that every educated person should have. If this were to be the objective, two observations follow. First, there would be less need to present subject matter solely because of a perceived need to satisfy prerequisites for follow-on subjects. Second, presentation of scientific material should be integrated into a social context. From the standpoint of educating citizens, a strong case can be made for reducing the extent of new principles and methodologies, and relating the science being taught to the aspirations of and challenges faced by society.

Achieving clarity of objectives should be at the heart of all discussions concerning the freshman year.

The suggestions concerning possible major changes of course raise serious questions. MIT and other research universities have become wedded to a lifestyle closely associated with scientific research. As observed by Karl Pister (Chancellor of the University of California at Santa Cruz) in a presentation to the Engineering Foundation Conference on Engineering Education in January of this year: "Regrettably, the scholarship of discovery has become intertwined with the economics of survival of our institutions, while other categories vital to the mission normally are disconnected from institutional wealth and prestige." Can the Institute afford a very different style of education? The better question perhaps is: Can we afford not to undertake a different and better style? From this standpoint, Arthur

Smith is dead right: The education of freshmen should be a concern of *every* faculty member.

Editorial Committee

[Editorial Committee members are always noted on Page 2.]

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Without Whose Assistance...

The Editorial Committee would like to thank Assistant Dean Margaret (Peggy) Enders for serving as *ex officio* member for the current issue. Her contributions were invaluable.

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Next Issue

Due to the (gratifying) overwhelming response to our request for articles relating to the freshman year at MIT, we have been forced to divide the contributions between two issues of the *Newsletter*. Thus next issue will feature freshman year pieces by Mel King, Arthur Mattuck, and Arthur Steinberg, among others.

There will also be an article on a proposed "intervention coalition" at MIT, and one updating us on research libraries. We are also expecting contributions concerning the Electrical Engineering and Computer Science curriculum changes.

We welcome contributions on any topic of interest to the MIT community. Please address your submissions to: **MIT Faculty Newsletter, 38-160; by FAX to 617-253-0458; or by E-Mail at fnl@zeiss.mit.edu.**

From The Faculty Chair

Changes in Degree Programs Highlight Fall Faculty Meetings

J. Kim Vandiver

I would like to extend a special greeting and welcome to new members of the faculty and invite you all to our faculty meetings this fall.

The first faculty meeting of the fall term will be held on October 21, the third Wednesday of the month, at 3:15 pm in Room 10-250. Other fall term meeting dates are scheduled for November 18th and December 16th.

the School of Science.

Another minor being discussed is in Education and is intended to be coupled with a recently publicized initiative to give MIT students the opportunity to receive certification to teach in Massachusetts.

Another matter of considerable significance is a five-year program leading to a new style of master's degree

in the academic community.

The October faculty meeting will immediately precede an Institute Colloquium on Academic Honesty entitled "Success and/or Honesty: In Here, Out There," which is being planned to give faculty and students an opportunity to engage in a serious discussion of expectations and practices here at MIT. [See p. 17.] I urge you all to participate in the Colloquium and events to follow. ♦



Currently minors may be offered only by departments in the School of Humanities and Social Science (SHSS) and the School of Architecture and Planning. Assuming the enabling resolution is approved, the first new minors to be proposed will come from the School of Science.

Any member of the MIT community may attend and all faculty beginning with the rank of assistant professor may vote.

Some of the more important issues to come before the faculty this fall are the focus of the remainder of this article. The first is a resolution enabling all five schools at MIT to offer minors. Currently minors may be offered only by departments in the School of Humanities and Social Science (SHSS) and the School of Architecture and Planning. Assuming the enabling resolution is approved, the first new minors to be proposed will come from

in engineering which is being proposed by the Department of Electrical Engineering and Computer Science. Considerable discussion in various councils and faculty committees will precede a discussion and vote at a faculty meeting.

The Ad Hoc Presidential Committee on the Academic Calendar will present a final report this fall with recommendations for modifications to future academic year calendars, including start and ending dates of the terms as well as IAP, reading and final exam periods. This is a subject of considerable significance for all of us

Has the "Survey of Faculty Attitudes Toward Undergraduate Academic Dishonesty" crossed your desk? This was the second of three surveys on the subject, sponsored by the MIT Colloquium Committee. The first was sent to undergraduates in the spring. Graduate Teaching Assistants have just been asked for their responses. If you haven't yet sent back your survey form, please do it soon! Your responses will help give all of us a better understanding of this issue, and will be very useful to the October Colloquium.

MIT Colloquium Committee
Travis Merritt, Chair

Questions? Contact Norma McGavern, x4849, 20B-140

The Freshman Year

Getting Away from the Assembly Line

Rosalind Williams

At its January workshop this year, the Committee on the Undergraduate Program and its guests discussed three areas of concern in MIT undergraduate education: the GIRs, engineering issues, and the freshman year. There emerged a clear consensus that of all these challenges, the most pressing is the need to improve the quality of the freshman experience. I was somewhat surprised by the strength of the criticisms expressed; many participants felt the freshman year needs not just improvement but radical change.

I was also struck by the quality of the criticisms. Over and over again, faculty and students alike described the present freshman experience as alienating, depressing, and cheerless, as one that erodes self-confidence and discourages intellectual courage. The central problem of the year, as they defined it, is not the failure to cover certain material, but the failure to inspire certain attitudes.

This analysis will not sit well with everyone at MIT. Here we prefer to deal with problems that are quantifiable, and to use rhetoric that is hard-headed and tough-minded. But what is unquantifiable is not necessarily unimportant. From our own experience as researchers and teachers, we are keenly aware that knowing things is only one part, and often a relatively minor part, of professional and scholarly achievement. We realize that traits like creativity, adventurousness, self-confidence, and inspiration are also essential elements. Our challenge is to nurture those traits in our students – our potential successors – especially in their first year, when long-lasting habits are still taking shape. We need to encourage freshmen to become active participants in their own education,

rather than passive observers.

To do this, we have to give them more flexibility. We should heed some lessons from the industrial world, where assembly-line models of mass production are rapidly giving way to flexible modes of production. In a world of diversity

smoothly. Their diversity is not just an artifact of the MIT admissions system; it is a fact of life in the postmodern world. We have to provide a more flexible educational system that fits the world as it exists and as it is evolving – not some ideal world of the past.

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and constant change – today’s world – successful industries are learning to optimize adaptability, to be open to external influences, and to accept high rates of change. In contrast, MIT undergraduate education still resembles a Fordist assembly line. As undergraduate educators, we are still operating a relatively inflexible system; we tend to resist outside influences; and the rate of change is very slow. We put the incoming freshman class on a pedagogical conveyor belt and hope that at the end of the year we still get a standardized product of reasonable quality, suitable for entry into any major here.

As the incoming students become increasingly diverse in their goals and preparation, however, it is harder and harder to keep the assembly line operating

And, in fact, we are building more options into the system – gradually, sometimes reluctantly, but constantly. Many of the issues that came before CUP this year involved faculty-initiated efforts to introduce more flexibility into the freshman core. For example, last fall a math diagnostic was introduced in R/O week to help advisors direct incoming freshmen to the most appropriate classes. The diagnostic has stimulated responses from both the Mathematics and the Physics Departments. This fall the Math Department is treating the diagnostic as “unit zero” of 18.01, and is strengthening it with other tests and tutorials. For its part, the Physics Department has introduced a new version of 8.01 (called 8.01L) designed for students who need

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Getting Away from the Assembly Line

(Williams, from preceding page)

further grounding in some fundamental skills before getting too far into freshman physics. And in designing its new core subject options, the Biology Department has emphasized that it will offer different “flavors” designed to appeal to the various intellectual flavors of our student body.

Finally, and perhaps most significantly, when the Chemical Engineering Department requested permission to exceed the cap on departmental units so its majors could take more chemistry, CUP counterproposed that the department instead specify that its students take 5.11 rather than 3.091 as their chemistry core subject. On one level, this can be interpreted as a nifty but evasive bookkeeping maneuver (now 5.11 counts in the GIR pile of units, not in the departmental pile). But on another level, CUP was making an important policy statement. It was proposing that departments should not be rigidly excluded from the freshman year as a matter of principle, and that students should instead be free to assume some responsibility for what they study that year based on their prospective major.

Obviously this principle may create problems for students who are not certain of their majors, or who change their minds. Some freshmen who make the “wrong” choice may have to undertake remedial work later on. To the CUP, however, the potential liabilities seemed outweighed by the value of empowering freshmen to have some say in charting their own course.

Another form of flexibility is slowly but surely increasing in the freshman year; this involves not content but format, not what but how. In industry, the alleged efficiencies of mass production,

which used to be assumed, are now being questioned. In education, the monotonous pedagogical format of large lecture-recitation, no matter how well done, tends to distance students from faculty and to induce general passivity. One striking finding of the intensive studies of undergraduate education

coins of the MIT realm. But it might not be as costly as we imagine, and we need to keep diversifying and decentralizing, while keeping track of costs and benefits.

Making the freshman year more flexible is not code language for scrapping the core. On the contrary, the only way to preserve the essential

Making the freshman year more flexible is not code language for scrapping the core. On the contrary, the only way to preserve the essential integrity of the core is precisely to make it more responsive and adaptable. This is also the only way to fulfill our responsibility to our students.

carried out by the Harvard Assessment Seminars is how much students benefit in all their studies when they take just one small class each semester.

Here at MIT we need to introduce more variety in the scale of instruction. For two decades now the alternative freshman programs have experimented with a wide variety of small-scale teaching methods, including the use of upperclassmen to tutor freshmen. For nearly as long, very-small-group experiences have been used in engineering subjects such as 6.001 and 6.041, with marked success. Even more recently, the proliferation of freshman seminars has offered both freshmen and faculty the pleasures of close intellectual and personal contact. To be sure, diversifying teaching formats may be costly in time, space, and money – all

integrity of the core is precisely to make it more responsive and adaptable. This is also the only way to fulfill our responsibility to our students. When they graduate on the eve of the 21st century, the only thing we can predict about the world they will enter is that it will be unpredictable. If their education here has been rigidly standardized, they will be lost in a world of constant change and enormous diversity. They will find their way only if we have nurtured in them the habits of adaptability, self-education, alertness, and self-confidence – and we should start encouraging those habits in their freshman year.



Undergraduate Education and Student Affairs**The First Year, the Dean's Office,
and the Dean**

Arthur C. Smith

I want to tell you how I see my role as Dean for Undergraduate Education and Student Affairs and the role of UESA (the Dean's Office) in the first-year experience of our students. For all students, our role is to increase the opportunities for student success in many arenas – living groups, activities, personal accomplishment, academics, and self-governance are examples. While it is occasionally necessary to adopt a directive stance in order to preserve opportunity for others or to resolve conflict, our normal mode of

teaching and with reviewing and modifying the Faculty Regulations which help to define the first-year educationally. These two offices have been for the most part cooperative, occasionally competitive or redundant, and often uncertain about the appropriate division of effort. One goal of the reorganization which combined these offices is to improve our performance of these functions and eliminate duplicate efforts.

The Dean for Undergraduate Education and Student Affairs should be an advocate

order to carry them out.

I believe that the *entire* faculty shares the responsibility for the education of our first-year students. I want to make it possible for us (and from this point on, 'us' means 'us faculty') to exercise this responsibility more effectively. In recent years, we have voted to make substantial changes in the regulations governing the first year (adding biology, changing the level of Pass, changing the credit limit, etc.) but actual faculty contact with first-year students was limited mainly to those who teach HASS and core science subjects and a relatively small number of freshman advisors. I want to encourage activities which will give many more faculty the opportunity for personal interaction with first-year students.

One such activity is the Freshman Advisor Seminar Program which has been substantially increased in the past two years. It has grown to over 120 seminars this fall. All freshmen who want to should be able to have the experience of small group study with a faculty member. This is a valuable experience for the students and for the individual faculty who take part. From the Institute view, there is the important additional benefit that an increased number of faculty will have had direct experience with students *while they are freshmen*. This personal contact increases the faculty's knowledge of the educational environment in which first-year students learn and enhances our sense of responsibility for an effective first-year program. I would like to find ways for more faculty to have direct experience with students during the first year.

This fall, I intend to ask faculty from all parts of the Institute to assist me in two major areas. In each case I will be asking for more than ordinary casual participation on a committee. The issues require the

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This fall, I intend to ask faculty from all parts of the Institute to assist me in two major areas. In each case I will be asking for more than ordinary casual participation on a committee. The issues require the kind of intense fact gathering and analysis that faculty are reputed to reserve for their research activity and I hope that enough faculty will share my view of the importance of these concerns so that we may proceed.

action is one which encourages independent and creative activities on the part of students, individually and in groups. When we are successful, we say 'yes' much more often than we say 'no', and 'why not?' rather than 'why?'

For many years, the Office of the Dean for Student Affairs has played a major role in the first-year experience. Freshman advising, the introduction to MIT that occurs during R/O week, the managing of housing assignments, Project Interphase, and study skills sessions have been among the responsibilities of ODSA. Since its formation, the Office of the Dean for Undergraduate Education has been concerned with the academic side of the first-year, with the effectiveness of

for the first year. This advocacy includes concern with allocation of resources (finances, space and people) and with educational content and style. Since allocation of resources and delivery of education are the responsibilities of the departments and schools (and ultimately of the provost), it is clear that a mode of interaction needs to be established which will allow me to interact with department heads and school deans and carry out my role as advocate in an effective way. This is an important agenda item for the Education Subgroup of the Academic Council that the provost has convened. I look forward to finding ways to clarify our various roles and to establishing such new procedures as prove necessary in

The First Year, the Dean's Office, and the Dean

(Smith, from preceding page)

kind of intense fact gathering and analysis that faculty are reputed to reserve for their research activity, and I hope that enough faculty will share my view of the importance of these concerns so that we may proceed.

The first of these is the need for a careful look at the educational process which takes place from the time freshmen arrive until they join departments. I would expect that the faculty who serve on this committee would spend significant time observing what we do, trying to understand the characteristics of the freshman class and making an assessment of the effects of first-year policies on the total education of students. I will ask them to make recommendations on directions for change and to estimate the resources necessary to achieve this

change.

The second area on which I want to focus faculty attention can be described in various ways – the Institute Laboratory Requirement, hands-on learning, the role of UROP, real experience with real things – are phrases that occur to me. Many of us believe that this aspect of learning must be a significant part of each student's experience at MIT; fewer of us have clear ideas as to how to assure that it happens; still fewer have displayed a willingness to devote their energy and time to making it happen. I think it is vital and long overdue – it is also likely to be costly to implement. It will only be possible if we can find a model which can enjoy widespread faculty support and I want to make a serious effort to do so.

I don't know if all deans are created

equal, but I do know that the School Deans were created long ago and they enjoy the authority of tradition as well as the force of personality. This Dean is a newly created one and the current incumbent will need the help of his friends. I welcome your ideas, your comments and criticisms and an occasional encouraging word – most of all, I will welcome your active assistance in carrying out the agenda on which we come to agree.

This year I told the entering class that whenever they see a statement that starts "MIT ought to ..." they should realize that things can only happen if people do them and in order to get things to happen, they have to find out who the people are who do the work. I'm sure that I don't have to tell you that when it comes to education, if we don't do it, it won't be done.

Freshman Advisor Seminar Program Wins Sizer Award

The Irwin Sizer Award is presented annually for significant innovations or improvements to MIT education. The award is named in honor of Irwin Sizer, dean of the Graduate School from 1967 to 1976, and includes a \$500 prize. Past winners have included the Experimental Studies Group, the Women's Studies Program, and the Technology and Policy Program.

The winner of this year's Sizer Award for the Most Significant Improvement to MIT Education is...the Freshman Advisor Seminar Program and Professor Travis Merritt of the UAAO.

The Institute has long recognized the importance of advising within the first-year experience; the potential for significant mentoring, for faculty-student interaction, and for easing the difficult transition to MIT and college in general. In 1986, the Dean's Office launched an ambitious program to provide more significant interaction within the freshman advising relationship. The idea behind this "Freshman Initiative" was for first-year students to attend small, 8-10 person seminars actually taught by their

advisors. These "freshman-advisor seminars" would provide for weekly interaction between advisors and students while they shared a common intellectual pursuit – just the sort of experience desired from the advising system.

By all accounts, the program has been a tremendous success. From eight seminars in 1986, the program has grown to 127 seminars for next year involving almost 200 faculty and staff advisors. The seminars have been received with enthusiasm by both advisors and students. Comments we received praised them for "enriching personal relationships," "improving the quality of student life," and "providing a really cool way to get to know my advisor better."...

The success of the program is a testimony to the dedicated support of the Dean's office and the UAAO staff, and to the faculty, staff, administrators, deans, and chairmen of the Corporation who have served as advisors.

But more than any other single individual, the success of the Advisor Seminars is laid

squarely at the feet of Professor Travis Merritt, Section Head of the UAAO, who has been a force behind the program since its inception. The success of the program has been described as a "personal mission" for him. Professor Merritt's skill at recruitment is now the stuff of legend; more than once we've heard the stories of colleagues hiding when they catch sight of him coming down the hall. One letter-writer commented on his insistent cajoling. "I came to realize that...I either had to give an advisor seminar or go around thinking that he cares barrels more than I do about the humanization of the first year at MIT."...

For promoting student-faculty integration in a unique setting, for providing crucial support for first-year students, and for changing the face of advising at MIT forever, the 1992 Irwin Sizer Award is presented to the Freshman Advisor Seminar Program and Professor Travis Merritt.

**Presented by Alan Davidson
for the Graduate Student Council
May 6, 1992**

The Freshman Year: Why Hell?

William H. Orme-Johnson

“No man is an Iland, intire of it selfe: every man is a peece of the continent, a part of the Maine; if a Clod bee washed away by the Sea, Europe is the lesse, as well as if a Promontorie were, as well as if a Mannor of thy friends or of thine own were. Any mans death diminishes me, because I am involved in Mankinde. And therefore never send to know for whom the bell tolls; It tolls for thee.”

– from *Devotion XVII*, John Donne.

The non-inclusive language aside, I take the above to represent the best spirit of our age, in part, at least, explaining to myself why life-affirming, patently altruistic activities persist in this institution. These activities are in spite of the instrumental contexts that surround students and faculty alike, contexts that make it clear that triage precepts determine the pattern of all our waking hours. It is particularly interesting in the MIT setting to recall that Donne goes on in *Devotion XVII* to write approvingly of the uses of human suffering, both for the sufferer and for the onlooker, uses currently summarized in “no pain, no gain.”

Clearly, only a true unfortunate would advocate enduring a scintilla more pain than the gain is worth on a personally controlled scale. Specifically, I have in mind here the faculty-determined aspects of the socialization of the brightest high school students, valedictorians or thereabouts, to be, on the average, an average MIT undergraduate. It may be so, as some aver, that our undergraduates are tribal (hence, “Welcome to Hell” and “IHTFP”?) and like the rest of us they have at best the maturity of their years. Equally surely, some of their utterances

appear to reflect a less than optimum learning situation: Although I’m convinced that twenty-two years as a college teacher (ten of those years at Wisconsin) and four years as an MIT housemaster have not *yet* qualified me as a particularly trustable interlocutor of undergraduates, nonetheless it *has* been asserted within my hearing that “MIT is a final act of sadism by neurotic adults on teenagers” and “to me the best metaphor for an MIT education is a faked orgasm,” to cite two of the more

What I wish to advocate in this article is that we use some recent thoughts and experiences, as reported by MIT people, in seriously tuning the freshman year.

colorful examples.

What disturbs me most is that seniors, respectable performers, say such things. Worse still, they may think them true. What encourages me in my own locale is that upperclassmen in Bexley have for the third year organized advising and tutoring for the house freshmen. Given the demands on them, I am heartened but amazed by their willingness to ration out small but crucial portions of time and energy to their fellows – hence the epigraph. I believe that such efforts, at various levels of formality and in many living groups beyond my own, are immensely supportive and build community in a number of useful ways, and that along with the Freshman Advisor Seminars present a human face of which both the freshmen *and* the Institute have

need.

What I wish to advocate in this article is that we use some recent thoughts and experiences, as reported by MIT people, in seriously tuning the freshman year, specifically the *heart* of the experience, the academic program.

A first notion to consider is one that Dan Kemp has explained on occasion (e.g., *Civitas* (1992) Vol. 1, No. 2, p.16ff), to wit, that we could with profit run the undergraduate program on the boot-camp model, which is to say with the current variety of teaching resources plus one further step of commitment: Thou wilt not fail. The current model, more in the vein of Super Fly (are you big enough, are you bad enough?) offers plenty of help on its own terms, but forces students to learn a rigid triage system, allocating fixed amounts of time to each course and building to three or four major crises (exams) per subject, finals being a sort of vest-pocket Gotterdammerung.

In his work on optimizing the learning of first-semester organic chemistry (subject 5.12). Kemp has experimented with a multi-part strategy (*MIT Faculty Newsletter*, September 1991, p.9) in which key conceptual stumbling blocks were identified and dealt with at early appropriate moments, the problem sets were ramped up in difficulty to draw in the students through a series of successes, while attention was paid to coping with exclusive, filtering listening patterns. The rich payoff from identifying missing links in a given student’s understanding, by selective tutorial vigilance, as well as the benefits from sensitively expanding the contextual frame during the semester, were noted. Strikingly, it appears that giving exams very frequently kept the

(Continued on next page)

The Freshman Year: Why Hell?

(Orme-Johnson, from preceding page)

crisis juices flowing at a useful level, and by students' own accounts this materially aided their learning.

As to this last point, further study may establish that "taking an even strain" in *all* subjects would positively transform the experience of the whole semester; at the least, managing a large number of smaller crises may be more engaging or at least less aversive. Certainly acting on the whole suite of suggestions contained in this work, if folded appropriately into the peculiarities of the math/physics/chemistry/biology core, would send a powerful, redefining message to the entering class, perhaps even going so far as to send them a welcome to the company of scholars, instead of handing them a ticket to a rather nasty real-time version of the Magic Flute.

A second notion that seems of importance flows from work Ben Snyder has done as a follow-up to the "The Hidden Curriculum," and which he has described in *Daedalus* (1990), volume 119, No. 2. He identifies two modes of thought; briefly these are (1) formulations fundamental to the natural sciences, where objects either lack intentions or their intentions are irrelevant, and where laws, predictions, and quantitative calculations have a comfortable durability, and (2) formulations about objects which have intentions and thus social and psychological dimensions, where truth is relative and subject to revision, being sought after but of unsatisfactory durability. An important conclusion, and this is strongly reinforced by my experience at Bexley, is that it is exactly those who master *both* modes of thought who are the imaginative innovators we would seek as colleagues on the faculty, while at the same time the MIT undergraduate "system" drives out

exactly such spirits, concentrating instead on the masters of mode (1) and giving some truth to J.K. Galbraith's famous canard "*ordinary* lumber will do for the sciences." This is the point to humanities, arts, and social sciences in the education of scientists and engineers: *We all* sense that, but it seems to me that we have to go further and address Snyder's analysis in a positive way.

Recognizing cognitive styles, intellectualizing them, debating them, even changing them, may not be itself a dominant style at MIT, but we can with profit follow Socrates in this, at least to the extent that technical competence alone is not enough.

The third notion I ask you to contemplate arises from that striking experiment, called "the math diagnostic" but which I think of as the Physics I diagnostic. The point is not a quibble with what is being tested or predicted, but is instead the institutional *style* of this effort: The test, though required of freshmen, and sent to advisors, is in fact a *diagnostic tool*, which imparts information and suggests a course of action which becomes largely the property and responsibility of the student. This suggests, it seems to me, far more than the immediate needs of remediation: It also expresses confidence in the good sense of the student.

What would happen if *all* the freshman courses were conducted in an analogous fashion? What would happen if the examinations were given, as at present or in the improved, high frequency mode of Kemp, graded, and returned to the students, but the grades would not count toward the final mark, being advisory only? (All tests would have to be recorded as seriously attempted, to qualify the student for *credit* in the subject.) The mark in the course would

be awarded after a final exam, given by persons *different* from the teachers in the subject, but otherwise most interested in competency issues. This would have two very interesting effects: It would put a great deal of trust in the maturity of students, which I believe would be itself a maturing force, and it would put the instructors and the students firmly on the same side of the teaching issue, as far as instrumental behaviors are concerned.

In short, QC on *both* the students *and* the profs would take place at once. One would want retakes for people who had health problems during the semester: Probably *viva voce* exams, if conducted skillfully and humanely, would be both efficient and just in such cases. Overall, the point is to increase the proportion of diagnostic advice, while asking the evaluative question, What is understood? at the latest moment so as to maximize the emphasis on retention and integration of concepts. [What bliss *never* to have to hear again "0-0-0- we learned that last semester – do I still have to know it?"; I won't hold my breath.] Also the message, *you* are responsible for managing your learnings, is the best real-world message we could send, I believe.

Not that I believe that Hell will go away very soon if ever. Over and over we observe in our lives the Dark Side, e.g. "it is not only necessary that I should succeed, but also that others should fail G. Vidal" and "Hell is other people - Sartre, *No Exit*," to mention two of the many Bexley graffiti. But I believe that for rational, instrumental, MIT reasons, having to do with the criticality of the creative mind to human welfare, we had best turn ourselves, once more, to the amelioration of needless misery among our charges.



What Can We Do About The Freshman Year?

(Rogers, from Page 1)

MIT's educational success is confirmed by such external recognitions as fellowships, graduate admissions from MIT, and peer evaluations. One of our "best-kept secrets," for example, is our truly extraordinary record of medical school admissions – a record which is, I believe, far superior to that of any other university.

The MIT freshman year seems to be another story. Faculty committees on

largely occupied with anecdotal report and parochial grievance. Both faculty and administration must share the blame for this circumstance. Administration initiatives have sometimes lacked definition and consistency. (The meaning and implementation of "diversity" form a case in point.) The faculty has not developed and promulgated a coherent educational mandate for the freshman year, a mandate which could be used to

Because of the requirements and expectations of the upper class departmental programs, the academic component of this transition must be paramount. While the need for a suitable balance of academic with personal and social factors must be respected, the ultimate defining transaction of the freshman year at MIT is academic and intellectual.

(2) Successful transition to upper class departmental programs implies remedy of significant disparities in academic background among entering students. Remedy of disparities implies that the freshman educational experience will be more strenuous and constraining for some students than for others. It implies also that this imbalance will be greater in the first year than in later years.

(3) Successful transition therefore implies a diversity and flexibility of academic pathways through the first year to accommodate, as may be practicable, the diversity of students' academic backgrounds.

(4) Common goals of the various academic pathways should be as follows. In science:

(a) to develop substantial creative capabilities of analysis and problem-solving in the student, and to do so in the context of fundamental mathematical and natural sciences;

(b) to give first-year students a disciplinary introduction to these fundamental sciences in courses taught by practitioners of these sciences;

(c) to provide students with a common corpus of basic mathematical and scientific knowledge upon which upper class departmental programs can rely.

The current first-year corpus at MIT has evolved to match the needs and resources of these departmental
(Continued on next page)

For most students, the freshman year at MIT is a year of transition. Because of the requirements and expectations of the upper class departmental programs, the academic component of this transition must be paramount. While the need for a suitable balance of academic with personal and social factors must be respected, the ultimate defining transaction of the freshman year at MIT is academic and intellectual.

undergraduate policy, curriculum, academic performance, calendar, and admissions consider and debate, at length, the nature and quality of the freshman year. Significant contributions have emerged from these deliberations – for example, the Writing Requirement, the freshman load-limit, adviser seminars, new experimental programs, and improved administrative coordination. On occasion, the faculty as a whole also considers and debates the freshman year. The faculty's most significant recent action has been the addition of biology as an Institute-wide requirement.

Despite these achievements, discussions of the freshman year are often dispirited, lacking a shared perception of purpose and objective, and

help evaluate and judge suggested policies and initiatives.

Nevertheless, such a mandate is, in some measure, implicit in the MIT first-year program as it presently exists and functions. Indeed, beginning with the influential report of the Lewis Commission in 1952, and continuing through the work and reports of the late Dean MacVicar and the work of the recent Committee on the Science Requirements, a consistent sense of educational mission has continued to evolve among those committees and individuals primarily concerned with administering and teaching the first-year educational program. I would summarize this implicit mandate as follows:

(1) For most students, the freshman year at MIT is a year of transition.

What Can We Do About The Freshman Year?

(Rogers, from preceding page)

programs. It is otherwise somewhat arbitrary in content, since any intended and appropriate body of common scientific knowledge for all MIT graduates must exceed what is now taught in the first year, and since the use of shallower but more inclusive survey courses is precluded by goal (a) above.

In humanities, arts, and social sciences, the academic goals for freshman programs are analogous in form but less constrained with regard to content. They are:

(d) to develop, in the student, certain modes of expression, analysis, and sensibility;

(e) to give students disciplinary introductions in courses taught by practitioners in those areas;

(f) to ensure that students take appropriate first steps towards including a reasonable and representative spectrum of areas during their undergraduate years.

The goals in (a) - (f) continue to evolve.

It is expected, for example, that the lack of "hands-on" experience in the first year will be studied and debated during coming months.

The framework of General Institute Requirements appears to be a useful and reasonable vehicle for achieving the general mandate described above. This framework implies a need for an appropriate monitoring of the content and effectiveness of subjects taught as General Institute Requirements, a need for appropriate links of communication and feedback among interested individuals and departments, and a need for appropriate avenues of change. Several years ago, it appeared that the Committee on the Science Requirements might provide a feasible and faculty-centered answer to these needs. This committee, however, has ceased to exist.

Although the first-year mandate described above may be implicit in what we do, it has not been given explicit

visibility, authority, and acceptance. If it had such authority and acceptance, the discussion and resolution of educational problems would be facilitated and advanced. Here is one example: The mandate's emphasis on transition implies that for some students, the educational experience in the first year is, and should be, different from what it will later be in the upper class years. It follows that the overall structure and calendar of the freshman year should be more free to reflect these differences. In particular, this suggests that policies governing the use of IAP by first-year students should be reviewed and perhaps modified to allow selected versions of first-term subjects to extend into IAP with a longer reading period and finals. It suggests, as well, the exploration and encouragement of other organized academic activities in IAP that might contribute to successful academic transition in the first year.



Freshmen Enrollment Figures

	<u>1991</u>	<u>1992</u>	<u>Change</u>
Freshmen Applications	6481	6662	181
Freshmen Accepted	2012	2219	207
Freshmen Enrolling	1049	1147	98
Yield: Percentage Enrolling	52%	52%	0%
Breakdown on Enrolling			
Male	679	745	66
Female	370	402	32
Percentage of Women in Class	35%	35%	0%

Source: MIT Admissions Office

Freshmen: Give Them More Responsibility For Learning

(Ingram, from Page 1)

by trusting them to shoulder much more of the responsibility for learning. How can we do this?

– The General Institute Requirements are vital to the kind of education that MIT is good at providing. Their main function is to give the MIT student body a common science language. Whatever their specialization might be,

week of classes, to outline the basic concepts and to show the freshmen why it is interesting, as well as important, for them to learn basic math, physics, chemistry, biology. How will these disciplines impact on their future interests?

– Secondly, these same lecturers could put a semester's worth of lectures

– The centerpiece of my proposal is that there must be a really interesting weekly set of problems to be solved by the student with the aid of closely linked readings, computer-simulations and, most importantly, the formation of study groups of 4-6 freshmen, residence based. Although initially assigned to these groups, freshmen would be encouraged to reassert themselves according to their own preferences. The answers to such cooperatively solved problem sets would not be graded, but would be discussed with a recitation instructor in recitation sessions. Training of recitation instructors would be of the utmost importance, as it is now. Help would also be available on Athena. There would be weekly short quizzes, proctored, closed book, based on one or two problems from the previous week. These would be graded and mandatory, as would written final exams that pull the subject together. For students who wish to progress more rapidly these problems could be made available at the beginning of the semester and quizzes and exams when they needed them.

– True, this proposal would increase somewhat the burden of writing problem sets and quizzes, but the effort would, I believe, be worthwhile. We would greatly stimulate the learning desire of freshmen since they would have more control over their rate of progress. Many of them would gain time to do other interesting things. For the many MIT freshmen who do not wish for a more flexible or a faster pace the new proposal would provide the

(Continued on next page)

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they will retain this broad conceptual framework.

– On the other hand I do not see the value of freshmen sitting in a lecture of 50-500, where they are presented (“spoon-fed”) with what they are supposed to learn. It encourages the all too pervasive attitude of “teach me what I need to pass the tests and don't bother me with anything else.”

– Certainly there are many excellent lecturers at MIT who are able to inspire freshmen; their influence should not be lost. These particular lecturers could be asked to give introductory lectures in their subject during the first full

on tape to be available for freshmen on MIT-TV with more screens available than now. This would be important for review and most importantly would enable individual students to go through study material at their own pace. They could finish a subject rapidly, if they wished, and go on to something else in the curriculum or outside the curriculum. We should make tests and exams available to such students when they needed them, by prior arrangement. If such rapidly moving students exceed the present credit limit, than we should allow them to do so upon recommendation of their advisors.

Freshmen: Give Them More Responsibility For Learning

(Ingram, from preceding page)

same rate of progress as at present, but with the added invaluable support of their peers.

– The increased use of computers in aiding the understanding of experiments through simulation is an innovation long overdue at MIT, of all places! For example, in my own subject, biology, one can now set up, perform, and evaluate genetic experiments. While not the same as performing the actual experiments with its own hazards and frustrations, it forces the student to understand the principles of genetics in a way no lecture or textbook can. There are many other examples in biology and in other areas.

– I urge this more individual approach to freshman learning from the experience of involvement with ESG, the Experimental Study Group.

In summary, there is much that we can do without increasing costs much to lighten the yoke round our freshmen's neck. Let us give them more responsibility. Let us treat them as adults.

P. S.

ESG is the oldest of the three alternative freshman programs. This community of 45-50 highly motivated freshmen typically do not go to the science core lectures, but study on their own or in very small groups with the aid of tutors. Thus they also do much of their learning in a peer group. ESGers learn the same syllabus as other freshmen do and they must pass written exams of the same standard. However, they have great flexibility in scheduling their rate of progress by arrangement with their tutors. They also have the

opportunity, frequently taken, to study certain parts of the syllabus in greater depth, do special projects, etc.

– Another way of partially solving the difficulties of the present freshman year is to increase the number of alternative freshman programs, particularly some based on the model of ESG or of Concourse. The latter is

emphasized the new biology requirement.

P. P. S.

MIT is a community of scholars. The undergraduate is not truly a member of that scholarly community until he/she is an upperclassman. At the end of the freshman year we should recognize the freshmen's achievement of having

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totally different from ESG in that it provides its own lecture series in math, physics, chemistry, and a humanities subject. This group is quite self-contained, has its own recitation sessions. It operates very much as a community also. At ESG we were again oversubscribed this fall; we could only take 51 out of 66 applicants. With very few exceptions all of these could have benefitted from being in ESG. There is therefore reason to believe that there is another group out there who would use an ESG-like opportunity, especially if it were advertised as such and if the new ESG

managed the first year successfully by matriculating them, i.e., formally admitting them to upper class standing. A matriculation diploma and a ceremony with welcoming speeches is called for and would be an appropriate recognition of their progress. ♣

Freshman SAT Scores

	<u>1991</u>	<u>1992</u>
Verbal Mean	618	621
Math Mean	735	738

From the Admissions Office**Cycle for Admission of a New Class; or
What Do We Do the Rest of the Year?**

Michael C. Behnke

The cycle for admitting a new class of MIT freshmen is one of approximately 20 months, beginning in the winter of our prospective students' junior year in high school.

Late Winter

(when most prospective new applicants are in the 11th grade)

- Begin to update and redesign publications and application forms.
- Plan spring travel (research indicates that the brighter students have their list of potential colleges set by the end of junior year).

Spring

- Travel around the country to meet with juniors.
- At staff retreat, identify areas which need improvement and assign tasks for coming year.
- Buy from the student Search Service of the College Board names of students who achieved high scores on the Preliminary Scholastic Aptitude Test. Mail those students a brochure about MIT.

Summer

- Complete revision and production of new publications and forms.
- Begin projects assigned in spring staff retreat.
- Visit summer school programs for gifted high school students.
- Plan fall travel.

- Recruit new Educational Counselors (MIT has approximately 1600 graduates who interview applicants and represent MIT in their local communities).

- Enter demographic data for 20,000 "preliminary" applicants.

Fall

- Each admission officer spends 3-6 weeks traveling. We visit most major cities in the U.S. where we hold evening meetings for prospective applicants and their parents, dinner meetings with our Educational Counselors, and breakfast workshops for high school guidance counselors. We also visit high schools.

- Evaluate applications for Early Action.

- Educational Counselors interview applicants.

- Conduct telethons for women and minorities who have not completed applications.

- Enter grades, scores, other information for 7,000 applicants onto database.

Winter

- Make decisions on applicants for Early Action.

- Recruit and train faculty and staff readers.

- Evaluate applications.

- Start planning for Campus Preview Weekend for women and

minorities.

Late Winter

- Make decisions on applicants in early March.

- Hold on-campus programs and telethons to convince admitted applicants to consider MIT.

Spring

- Admit students from Wait list if necessary.

- Deal with reactions to negative decisions.

- Do transfer admissions.

Summer

- Do research on why admitted applicants did or did not choose MIT.

- Do research on performance at MIT to inform future admissions decisions.

All the Time

- Correspond with applicants.
- Meet with visitors to the campus.
- Interview students who don't live near an Educational Counselor.

- Respond to requests for information on students and the process from individuals within MIT.

- Maintain a database of names; each receives at least one mailing.

And then the process begins all over again...

If you have any questions, or would like to participate in the admissions process, please contact the Admissions Office at x8-5515.

Colloquium to Address "Intellectual Integrity"

Travis Merritt

This will be short and not unduly sweet.

On Wednesday, October 21 the Institute community will gather for an MIT Colloquium called "Success and/or Honesty: In Here, Out There" (see box below for details). The subject is intellectual integrity in its academic and post-academic settings, and the relationship between the two.

In recent months, as the Colloquium's theme has been discussed in formal meetings and informal conversation around the campus, the focus has been primarily on the ethical frailty of undergraduates. We remark with concern a perceived increase in cheating. We lament the collapse of honesty among our youth, and wonder aloud how probity can survive the corrosive influence of our society's deplorable values. We piously recognize that known cases of academic dishonesty are only "the tip of the iceberg," and we speculate in awe about how big the whole iceberg may be.

It is true, of course, that if it were not for a number of recent and celebrated cases of undergraduate cheating at MIT we would not be having a Colloquium on this topic at all. It is true, too, that many members of the faculty are quite aware of the ways in which academic dishonesty here is not just the undergraduates' problem, but rather the result of a sort of unconscious collaboration among all of us. This awareness is a healthy thing, but has not been sufficient to produce effective change in our habits.

As we move toward the October event, and into the year-long act of institutional self-scrutiny which will follow from it, we faculty – and, for that matter, all people who do teaching at the Institute – should be thinking hard about our own role as "collaborators." We should address in the most concrete terms such questions as these:

Can we find ways, consistent with maintaining high standards of academic

rigor, to reduce the sense of relentless pressure and overload which drives our students to cheat?

Can we make crystal clear to students in our classes precisely which kinds of collaborative teaming are permissible (and even laudable) on homework, and which ones are not?

Is it possible for us to avoid using the same problem sets, paper assignments, and exam questions over and over again – a practice which currently prevents us from making subject "bibles" universally accessible to all students?

Why do so many of us shrink from taking action when we detect or suspect an act of academic dishonesty?

How can we develop closer individualized contact with our students, so that they can learn more from us at close range about right conduct in the intellectual arena, instead of viewing us as part of a depersonalized system to "beat?" ♦

SUCCESS AND/OR HONESTY:

In Here, Out There
an MIT Colloquium

Wednesday, October 21, 1992

4:15-6:00 PM

Kresge Auditorium

A central concern of this Colloquium will be to explore aspects of intellectual integrity on a continuum extending from the academic world which students now inhabit to the real world in which they will make their working lives. A panel will generate a fast-paced exchange of views under the direction of economist Robert Solow, Institute Professor and Nobel laureate, who will serve as interlocutor. Panelists include:

Shirley A. Jackson, MIT, PhD '73
AT&T Bell Laboratories

Ken Olsen, MIT, SB '50
Digital Equipment Corporation

Kelly M. Sullivan, 2A/4
MIT

Margaret Marshall, President
Massachusetts Bar Association

Arun Patel, 7/4
MIT

David G. Steel, 8/G
MIT

Donald L. McCabe, Assoc. Prof.
Rutgers

Robert P. Redwine, Prof. of
Physics
MIT

Sheila Widnall, MIT, SB '60, SCD
'64
Associate Provost, MIT

Solar Sails, Computer Classrooms, and More

(Jackson, from Page 1)

assumed a resistive fluid and a keel, neither available on a solar sailboat. “What are you trying to do?” asked someone else.

Various minds put their energy into the problem over the next hour or so. Before long a useful solution emerged – head for Jupiter, slingshot around it, furl the sail, and head Sunward – from a discussion involving about 20 individuals.

Intrigued, I looked up some of the discussants’ userids, which appeared on the Zephyrgrams. The participants included:

- students scattered across the campus;
- two faculty members; and
- an assortment of staffers and hangers-on.

The annals of Zephyr are populated with many such stories (although, of course, they account for only a fraction of Zephyr traffic). The Zephyr stories have counterparts in other social network mechanisms at MIT, such as Discuss meetings, mailing lists, and (though I shudder to point this out) UseNet groups.

The point is this: As computer networks become pervasive, providing simple communication and discussion mechanisms of various sorts, they begin to redefine the scholarly community, and to do so in ways that enhance and enlarge it. As pioneers in pervasive networking and distributed computing, we at MIT are also pioneers in exploiting this important and largely unanticipated dimension of educational technology.

Detached computing can isolate students and faculty, diverting their intellectual energy to person-machine rather than interpersonal interaction. Networked computing, appropriately equipped, can do the opposite.

MIT’s academic computing services – especially Athena, but also numerous

other resources – aim to promote integrative, community-building use of technology. More traditionally, they also aim to enhance and improve lectures, recitations, laboratory work, undergraduate research opportunities, problem sets, library offerings, data analysis, and other familiar elements of MIT teaching and learning.

This year’s freshmen are the 10th class

access to more industry-standard third-party software than ever before. For example, they will be able to use SAS, the most widely used statistical package in the world, without having to pay for mainframe computer time. This year’s class will have twice the allocation of disk storage they would have had last year. And their files will be stored in the largest-ever implementation of the

Detached computing can isolate students and faculty, diverting their intellectual energy to person-machine rather than interpersonal interaction. Networked computing, appropriately equipped, can do the opposite. MIT’s academic computing services — especially Athena, but also numerous other resources — aim to promote integrative, community-building use of technology.

to enter since Project Athena began in the fall of 1983. Their Athena – indeed, their access to computing – will be dramatically better than the already admirable Athena that last year’s freshmen encountered. Once a research-and-development partnership among MIT, IBM Corporation, and Digital Equipment Corporation, Athena (no more “Project”) is now the premier distributed-computing service of MIT Information Systems (IS). Its mission remains distinctly educational, and its usage has continued to rise steadily.

Consider this: The Class of 1996 will be the first class to begin with widespread access to color workstations. These new workstations, the first to come from competitive bidding rather than corporate donations, have finally enabled us to retire most of Athena’s original workstations. This year’s class will have

Andrew File System, which provides cutting-edge flexibility and access control.

Obviously we’re proud of these enhancements, and want to see them used extensively in teaching and learning at MIT. I want to say a little more about these and other changes, to bring you up to date on Athena and academic computing more generally. What I especially want, of course, is for you to let us help you use technology to enhance MIT education.

Who’s “us”? My new organization within IS, Academic Computing Services (ACS), exists to make sure that faculty, students, and MIT education continue to benefit from the array of Athena and other computing technology available at the Institute. The Faculty Liaisons, with whom many of you are

(Continued on next page)

Solar Sails, Computer Classrooms, and More

(Jackson, from preceding page)

familiar, moved intact from Project Athena to Academic Computing Services. They have expanded to four talented individuals (Anne LaVin, Dot Bowe, Reid Pinchback, and Katie Livingston) led by Dr. Naomi Schmidt. The Visitor Center, whose Information Officer, Janet Daly, is also familiar to many of you, also became part of ACS. We in ACS work with colleagues in two other Information Systems divisions, Distributed Computing and Network Services and Computing Support Services, to develop, operate, and manage Athena and related network services.

We can only be effective by working with faculty members and other instructors, and we try to do precisely that. Recently, for example, we enjoyed working with a member of the Biology faculty to review and install simulation software for use in one of the 7.01 pilots, with a member of the Architecture faculty to make computer-aided design software and facilities available for use in several subjects, with Aeronautics and Astronautics to better integrate computing into the 16.00n Unified sequence, with Chemistry to make problem sets and solutions available online, with the ESG freshman program to explore ways computing technology might help blind students, with a member of the Mechanical Engineering faculty to animate his problem set solutions and make them available on Athena, Macintoshes, or DOS personal computers, and with a member of the History faculty to give her students first-hand experience with historiographic data analysis.

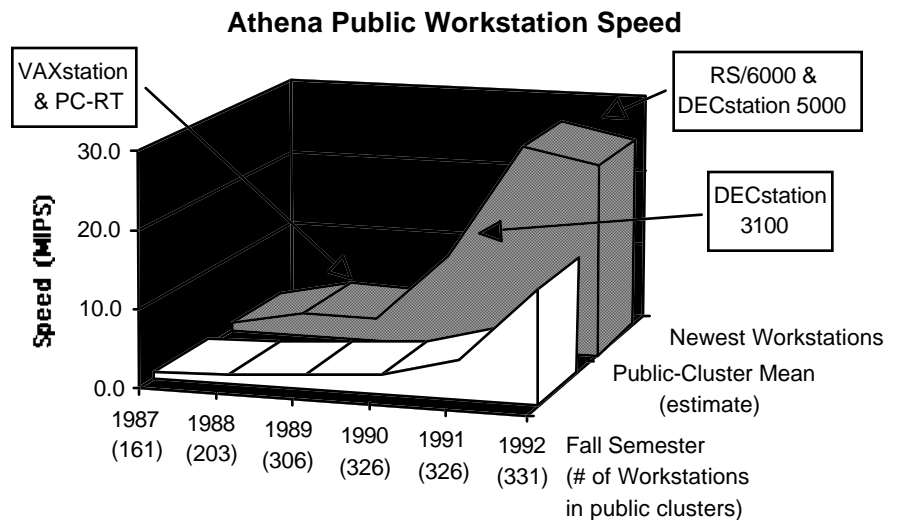
We've been busy in other ways too.

New Athena workstations (over 100 new client workstations and over 50 new servers) are going into public clusters, departmental clusters, and other

locations. For the most part we are replacing the oldest Athena workstations still in use (VAXstation IIs and 2000s installed in 1987) with color DECstation 5000/25s, but there are some new placements as well. The new machines are almost thirty times faster than the ones they are replacing. The Athena equipment renewal represents a dramatic,

with Athena workstations and video projectors this year. (Both lecture-hall projectors will work with Macintoshes and DOS computers as well.)

In collaboration with the School of Science, which provided and rehabilitated space, we built a new public Macintosh cluster in 2-032. This facility, an experiment to see whether unattended



continuing improvement that should greatly facilitate student computer work (see figure). As an interesting side note, our new workstations may constitute the largest single purchase of workstations ever by a college or university.

We built a new state-of-the-art electronic classroom in 1-115, and equipped it with a score of DECstations, a video projector, and printers. The Faculty Liaisons can schedule this classroom for lectures, recitations, or demonstrations. In addition, we upgraded the equipment in an existing electronic classroom, 14-0637, which has 17 workstations and is well suited to seminars and discussion requiring Athena displays. We expect to equip at least two lecture halls (1-390 and 6-120)

Macintosh clusters are manageable and useful at MIT, has 15 networked Macs (one projectable), a server that can restore disabled machines, and a printer. The cluster is set up either for public use or, by reservation with the Faculty Liaisons, for class meetings and demonstrations.

We are implementing widely useful third-party software on Athena for instructional use. For example, within the past year we added Xess, a powerful spreadsheet program; Maple, a comprehensive program for mathematical calculations, graphing, and symbolic manipulation; and SAS, a highly capable statistics program widely used in industry and in social science. We are evaluating programs that do

(Continued on next page)

Solar Sails, Computer Classrooms, and More

(Jackson, from preceding page)

computer-aided design and document preparation for future implementation.

With SAS now available on Athena, we've made numerous SAS-capable workstations available at the east end of campus, where most MIT social scientists work. We've helped Economics, Political Science, and

accessibility, and reliability of Athena files. We have almost doubled the standard disk quota Athena users receive.

We are arranging for Athena users, especially students, to have simple, free access to supercomputing. A VAX 9000 donated to MIT by Ken Olsen (the very machine used to refine the design of

other organizations worldwide. One interesting query came from the other university here in Cambridge, whose Board of Overseers appointed a special committee (including Senator Gore) to evaluate options for Harvard educational computing. When this committee named Athena as one of the few service models it wanted to understand first hand, we briefly installed and networked a remote cluster in a Harvard classroom to demonstrate Athena for them.

The transition of Athena into a stable computing environment, the expansion of network services for personal computers, and the various changes I outlined above all aim to improve MIT education through appropriate use of technology. This is the fundamental reason that the provost funds Academic Computing Services.

Our resources are limited. Although most of ACS's time and money go into maintaining current systems, applications, and courseware, we especially value opportunities to enhance instruction in the General Institute Requirements and other large subjects, to serve large numbers of students outside class, to explore innovative and creative applications of technology to education, and to reduce educational-computing disparities among departments.

Academic Computing Services is located on the third floor of building E40, at the east end of campus. We're easily reachable by telephone or electronic mail (x3-0115 or f_1@mit.edu for the Faculty Liaisons, x3-0194 or jdaly@mit.edu for the Visitor Center, and x3-3712 or gjackson@mit.edu for me). We most definitely make house calls, and will be delighted to hear from you.



We are arranging for Athena users, especially students, to have simple, free access to supercomputing. A VAX 9000 donated to MIT by Ken Olsen (the very machine used to refine the design of America3, the winner of America's Cup) and the MIT Supercomputer Facility's Cray should now be available from Athena without special arrangements.

History upgrade their departmental facilities. We've also installed new workstations ahead of schedule in the public cluster in E51-007.

We have worked with the MIT Libraries to enhance networked bibliographic and reference services. Online With Librarians, an interactive reference service, got underway this spring, and an expanded set of online bibliographic and statistical databases should be available soon.

A new release of the Athena system (7.4) is in the field. This release supports the new workstations, fixes a large number of problems and bugs, and increases consistency among the different types of Athena workstations. At the same time, users' files have migrated from the Network File System (NFS) to the Andrew File System (AFS), a move designed to increase the flexibility,

America3, the winner of America's Cup) and the MIT Supercomputer Facility's Cray should now be available from Athena without special arrangements.

We installed a diverse array of projectable workstations and personal computers in the ACS Visitor Center in E40, making it possible to demonstrate software or other applications on virtually any commonly used computer platform to audiences of 5 to 50 individuals. This room typically serves visitors who want to learn about Athena – we have several thousand such each year – but can also be scheduled for other uses. The ACS Information Officer handles inquiries about Athena from outside MIT, arranges presentations for visitors, and manages the Visitor Center facility.

We continue to field numerous inquiries about academic computing and Athena from colleges, universities, and

Athena Minicourses Cover Wide Spectrum

Jeanne A. Cavanaugh

The Athena Computing Environment has become an integral part of the MIT educational experience. One-quarter of the MIT community is currently using Athena on a daily basis. During the last academic year, 95% of undergraduate students and 79% of graduate students had Athena accounts.

Electronic mail, NEOS (the Networked Educational Online System) for electronic submission, exchange, annotation, grading and return of assignments and course handouts, and OLTA (On-Line Teaching Assistant) are proven ways faculty members have successfully used Athena to work more closely with their students. Many classes also make use of MIT-developed or third-party educational software as part of their curriculum. Two Electronic Classrooms with Athena workstations at each desk and a projector for the faculty workstations, as well as a cluster of Macintosh computers and projector can be reserved for lectures and labs.

New software is added regularly to the Athena software suite. If you wish to learn more about how Athena can be used in classes, please contact the Athena Faculty Liaison Office, E40-357/359, x3-0115, <f_l@mit.edu>.

To encourage and assist in the use of Athena, Information Systems offers minicourses on a variety of Athena-related topics. These courses are offered frequently throughout the academic year.

During the year, IS offers new and revised minicourses for all levels of users. Minicourses are held the first six weeks of each semester, the week after Thanksgiving and spring break, and the first three weeks of IAP. Classes run Monday through Thursday at noon, 7 pm, and 8 pm in Room 3-343. No registration is necessary, and they are free. Following are the current offerings:

How to Get Around Athena

Students will be introduced to Athena and Athena workstations. Topics include getting an Athena account, logging in, using files, directories, and windows, sending messages, and finding help and documentation. (Prerequisites: none)

Basic Word Processing and Electronic Mail

This course introduces elementary text editing with Emacs, sending and receiving electronic mail, and using the Athena printers. (Prerequisite: How to Get Around Athena)

Advanced Word Processing: EZ

EZ is an easy-to-learn, menu-driven combination text editor and formatter. The course covers how to create, edit, save, format, preview, and print EZ-formatted documents. Students will also learn about using online Andrew Help. (Prerequisites: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Advanced Word Processing: LaTeX

Students will learn how to prepare a document with LaTeX commands, run LaTeX on it, and preview and print the formatted result. Formatting mathematical expressions is a LaTeX specialty. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Information Resources on Athena

A survey of the communications, help, and other resources available on Athena. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Math Software Overview

This survey course introduces users to numerical and symbolic applications packages, as well as graphics packages and spreadsheets. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Matlab

Matlab is an interactive program for scientific and engineering numeric calculation. Applications include: matrix manipulation, digital signal processing, and 3-dimensional graphics. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Xess

Xess is a powerful yet easy-to-learn, menu-driven scientific spreadsheet. Users will learn how to create, edit, manipulate, and graph data from spreadsheets. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Serious Emacs

This course covers more advanced Emacs features including search, search and replace, multiple buffers and windows, cut and paste, customizing an Emacs session, and more. (Prerequisite: How to Get Around Athena, Basic Word Processing and Electronic Mail)

Dotfiles

Intermediate Athena users will learn about the Athena login sequence and the user-configuration files (dotfiles) that affect it, as well as how to customize their working environment. (Prerequisites: Serious Emacs, some Athena experience)

LaTeX Thesis

Use LaTeX to produce a document that conforms to the MIT specifications for a thesis. Students will learn about cross-referencing, creating bibliographies, and inserting figures and tables. (Prerequisites: LaTeX, some LaTeX experience)

Maple

This is a mathematics program with extensive graphics capabilities that performs numerical and symbolic calculations. (Prerequisites: Basic Word Processing and Electronic Mail)

For more information, send email to <training@athena.mit.edu> or call x3-0184.

Corrigendum**Military Support and MIT**

Herman Feshbach

In the last issue of *The MIT Faculty Newsletter* (Vol. IV, No. 6) an error in editing resulted in misinformation regarding recommendations of the *ad hoc* faculty Committee on the Military Impact on Campus Research (MICAR). The corrected relevant section of that article follows.

The Pounds Commission Report of 1969, a study of the involvement in DOD-supported research, commented on issues which are relevant to those confronting MICAR. The following two quotes are taken from that report.

“MIT’s evaluation of a project must address the questions of appropriateness that arise from the dedication of the university to humane objectives and must consider the attitudes of the MIT community.”

“Activity in education and research at MIT must be consistent with the underlying principles of humaneness and public benefit. The impact on society and on the university community must be recognized.”

These quotes emphasize the existence of an MIT community whose contribution to MIT policies is essential to their formulation and to their execution. Such participation requires a well-informed community. With that goal in mind, MICAR made the following recommendations which also speak to the desire for information uncovered by the Committee questionnaires. It is recommended that: (1) The support picture for each department and laboratory and for the institution as a whole, and in what way that picture is compatible with the goals

of the department, should be readily available and circulated to the MIT faculty, staff, and students; (2) There should be departmental and school seminars on their research support and its implications; (3) Each graduate research assistant, graduate research fellow, post-doctoral fellow, etc. should be informed to the extent possible by a statement in their appointment letter at the time of his or her appointment of the nature of their support, the supporting agency and the goals of the supported research; (4) Information regarding the careers of MIT graduates should be readily available. We recommend regular surveys of recently employed graduates to find out what they are doing and under what sponsorship.



**Selected DOD Support Ratios
(\$000)**

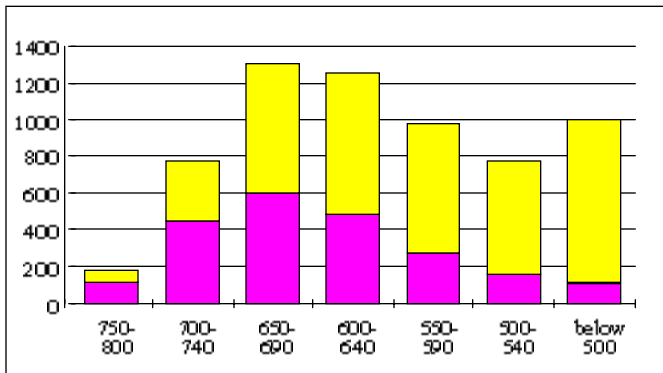
Department/Laboratory	FY70			FY80			FY90		
	DoD Support	Total Research	%	DoD Support	Total Research	%	DoD Support	Total Research	%
Aeronautics/Astronautics	744	2,839	26%	1,749	3,982	44%	1,570	6,741	23%
Artificial Intelligence Lab.	18	3,131	1%	0	6,335	0%	6,875	8,363	82%
Brain & Cognitive Sciences	25	882	3%	88	2,391	4%	1,218	6,821	18%
Civil Engineering	227	3,170	7%	136	3,812	4%	2,731	6,878	40%
Earth, Atmosphere & Planetary Sci.	1,185	3,167	37%	1,839	8,911	21%	1,332	10,855	12%
Electrical Eng. & Computer Science	1,186	2,194	54%	585	1,366	43%	1,643	5,706	29%
Lab. for Computer Science	0	0	0%	3,555	5,556	64%	9,699	14,881	65%
Lab. for Information & Decision Sys.	0	0	0%	780	2,134	37%	2,503	3,138	80%
Materials Processing Center	0	0	0%	312	931	34%	3,704	6,858	54%
Materials Science and Engineering	957	2,073	46%	1,081	5,448	20%	730	4,968	15%
Mathematics	310	919	34%	273	1,281	21%	493	2,783	18%
Mechanical Engineering	407	2,192	19%	509	4,513	11%	1,946	8,464	23%
Media Lab.	0	0	0%	0	0	0%	1,178	7,486	16%
Ocean Engineering	250	529	47%	676	1,571	43%	2,978	4,389	68%
Research Lab. of Electronics	1,438	4,775	30%	2,534	7,853	32%	5,479	13,547	40%
Space Systems Lab.	0	0	0%	0	0	0%	241	1,401	17%
Institute Total	15,707	58,126	27%	19,183	163,122	12%	51,158	310,660	16%

M.I.T. Numbers

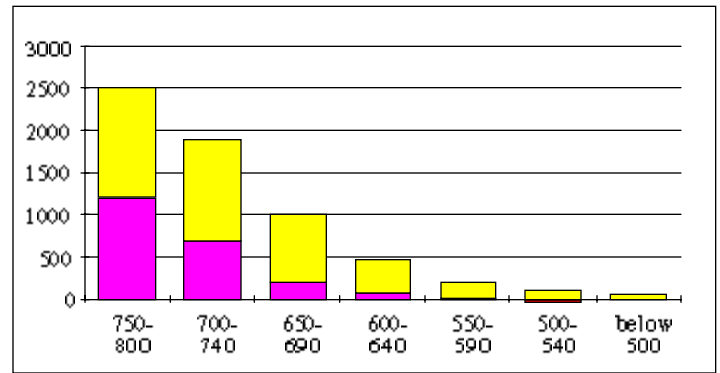
College Board Test Scores 1992 Freshman Class

Scholastic Aptitude Test (SAT)

Verbal

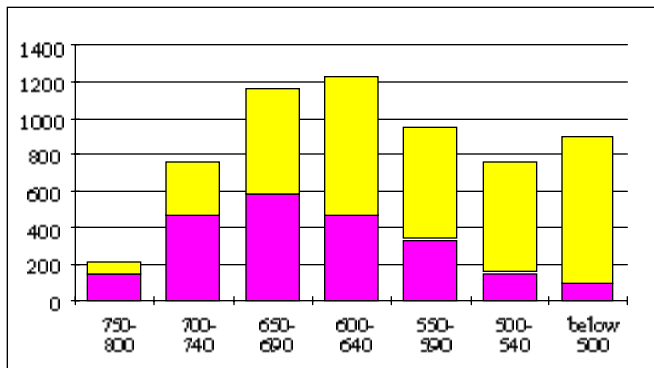


Math

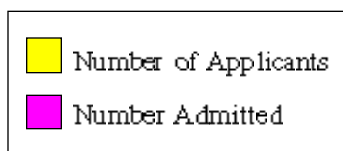
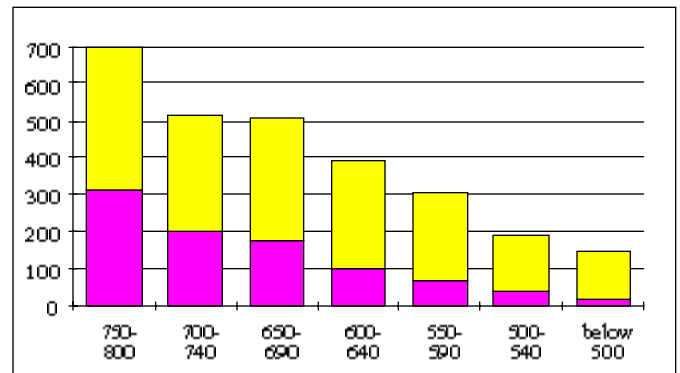


Achievement Tests

English Composition or History



Physics



Source: MIT Admissions Office

Who Gets to Write the Editorial?*

The MIT Faculty Newsletter is managed by a volunteer Editorial Board (currently 17 members). Individual issues of the *Newsletter* are the responsibility of 3-5 member subsets of this Board, called Editorial Committees. The task of each Editorial Committee is to choose a theme or themes for its issue, solicit input if necessary, interact with colleagues during the editorial process, and write the editorial. It is our practice to have one member of each Editorial Committee serve as chair of the subsequent committee to ensure continuity. Thus, each Board member will serve on one or two issues per year. The actual mechanics of production are the responsibility of the managing editor, who also serves as assistant to the faculty in all phases of *Newsletter* operation.

Meetings are held to a minimum; there are two meetings of the Editorial Board per year to discuss overall *Newsletter* policy. The individual Editorial Committees work within the bounds of this policy. The Editorial Committee for a single issue generally meets 3 or 4 times, usually over lunch.

A large Editorial Board ensures representation of many points of view and an equitably shared burden. If you would like to join the Editorial Board for the 92/93 academic year, please indicate your interest by any of the methods listed below: 1) Leave an E-Mail message at fnl@zeiss.mit.edu; 2) Send a FAX message to 617-253-0458; 3) Contact David Lewis, the managing editor, at x3-7303; 4) Contact any of the current Board members (listed on Page 2).

***This request for assistance was printed in the last issue of the *Newsletter* (April/May 1992). There were no responses. It may be that the problem was that April/May was the final issue for the academic year. So we'll try again at the beginning of the academic year.**