MIT

TASK FORCE on
student life and learning

In 1996 the Massachusetts Institute of Technology established the Presidential Task Force on Student Life and Learning, charged with undertaking a comprehensive review of MIT's educational mission on the threshold of the 21st century. The Task Force was led by co-chairs Professor R. John Hansman, Jr. (Department of Aeronautics and Astronautics) and Professor Robert J. Silbey (Department of Chemistry).

In the summer of 1998 the Task Force completed and published a final report. This document is available online below. Bound copies of the report are available from the Office of Academic Services at (617) 253-9419.

Task Force Final Report

- Final Report of the Task Force
- Members of the Task Force
- Members of the Student Advisory Committee

Student Advisory Committee Reports

- Final Report (Spring 1998)
- Preliminary Report (Spring 1997)

Other documents, reports, and discussion generated by the Task Force.

- Task Force Charge
- Faculty Survey
- Junior Faculty Workshop
- IFC Residence Orientation Report
- MIT Advisory Group on Orientation and Residence Report

- ❏ [Principles of the MIT Residential System](#)
- ❏ Web-based [discussion group](#) for MIT alumni.
- ❏ [Residence 2001](#)

MIT Updated Spring, 1999

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Contents

MISSION & PRINCIPLES

1

1.1 Introduction

In July of 1996, President Charles M. Vest appointed the Presidential Task Force on Student Life and Learning to undertake a comprehensive review of the Institute's educational mission and its implementation. The last review of this scope was carried out by the 1949 Committee on Educational Survey, known as the Lewis Commission, which examined MIT's education in light of the changes taking place in the aftermath of World War II.

Fifty years later, MIT has reached another historic crossroads: science, technology, and human organization are all undergoing rapid and dramatic changes. The present technical and political forces parallel those at key points in MIT's history. The information revolution, even in its infancy, has changed industry, economics, and society on a similar scale as the industrial revolution, which precipitated MIT's founding. Information technology introduces new methods for teaching and reduces the barrier of distance, challenging residence-based education. Investment in science and technology has shifted from a national defense basis to one encompassing economic viability, environmental concerns, and health care. Finally, students who come to MIT will participate in an increasingly global economy, whatever their career choices, and more leadership will be expected of them. The Task Force was charged with determining how an MIT education should reflect these changes.

In addition to technical and societal factors, the Task Force has considered the complex nature of problems facing society today, concluding that technical and scientific problem-solving must be linked with a broad, sophisticated understanding of these complexities. For our graduates to serve the needs of today's society, they must have an education that prepares them to handle such problems with flexibility and confidence.

MIT must also consider the changing demographic factors that impact student life and learning. The MIT community of students, faculty, and staff will continue to diversify as it has for the past several decades. The career trajectories of our alumni are also changing. Due to longer working lifetimes and the rapid pace of technical and social change, we must prepare our students to be successful in multiple career roles.

Finally, economic forces also motivate MIT to evaluate its educational mission, markets, and processes. The real costs of higher education will continue to rise, outpacing tuition and government sponsorship. Historically, the educational and research missions of the Institute have been of sufficient national priority that the federal government made significant investments in MIT; the endowment filled the gap between outlays and revenue from tuition and sponsored research. Today, budget pressures and shifting national priorities have decreased the commitment of the federal government to higher education in general, and to MIT in particular. Hence MIT must look strategically at its educational mission. An MIT education must be valuable enough to warrant the investment of our future students, sponsors, and donors.

1.2 Task Force Charge

In light of these historical and current forces for change, the Task Force on Student Life and Learning was charged with the following four goals:

- Review and articulate MIT's educational mission
- Evaluate the interaction between student life and learning at MIT in the context of that mission
- Evaluate MIT's current educational processes and identify changes that would enhance the educational mission
- Identify resources that would be required to support the educational mission including proposed changes

This report is organized along the lines of these four goals. In the first section, the Task Force presents its formulation of MIT's educational mission, along with the eleven principles that define MIT as an institution. The subsequent sections contain the Task Force's findings and recommendations concerning the interaction between student life and learning and the design of MIT's educational processes.

1.3 Task Force Process

Following its creation in July, 1996, the Task Force began its review by gathering input on strategic issues related to student life and learning. The Task Force's members examined a multitude of historical and current reports, analyzed numerical data, and conducted surveys of students, faculty, and alumni. The Task Force organized a special event for junior faculty, and held internal meetings with a variety of MIT administrators, sponsors, and faculty committees. Members participated in the 1997 retreat hosted by the Committee on the Undergraduate Program, and met with department and school heads and other undergraduate officers while there. Members also met and corresponded with hundreds of other groups and individuals inside and outside of MIT. Sources of input included faculty, students, student organizations, staff members, Institute committees, alumni, and external individuals and organizations.

The Student Advisory Committee to the Task Force, composed of roughly two dozen graduate and undergraduate members, met regularly during the two years when the Task Force was active, providing it with substantial input and feedback. The Student Advisory Committee published a preliminary report

in the summer of 1997 and a final report, entitled "Putting Education First," in the spring of 1998, both of which articulated how the concept of an educational triad composed of academics, research, and community could be implemented at MIT. The Task Force has endorsed the educational triad concept, and it is included here as one of the eleven principles of MIT.

The input received by the Task Force has been enormously valuable, and it has shaped every part of this report. Like the Lewis Commission before it, the Task Force has found the task of examining MIT's educational processes as a whole to be both daunting and enlightening. It is our hope that this kind of examination will become a more regular activity at MIT, and that those who have met with the Task Force to discuss strategic issues will continue to be engaged by members of the faculty and administration who implement the Task Force's recommendations.

1.4 MIT's Educational Mission

The first item in the Task Force's charge was to develop a statement of MIT's educational mission. The Task Force has reviewed the mission statements of the Institute's various departments and units, as well as the Policies and Procedures of the Institute, and has identified the principles that define it as an institution devoted to education and research. The following is the Task Force's formulation of MIT's educational mission:

The Massachusetts Institute of Technology is devoted to the advancement of knowledge and education of students in areas that contribute to or prosper in an environment of science and technology. Its mission is to contribute to society through excellence in education, research, and public service, drawing on core strengths in science, engineering, architecture, humanities and social sciences, and management. This mission is accomplished by an educational program combining rigorous academic study and the excitement of research with the support and intellectual stimulation of a diverse campus community.

1.5 The Eleven Principles

A mission statement can only go so far in defining an organization as complex as a modern university. MIT stands out, but what makes it unique among its peer institutions? Part of what has made MIT an effective and coherent educational institution is a common ethos and set of educational principles. But MIT has been a dynamic institution as well, and its ethos and practices have grown and changed to meet the needs of society. The Task Force has identified a set of eleven principles that define MIT. Four of these principles derive from the vision of MIT's founder, William Barton Rogers. A second group of four principles was articulated by the Lewis Commission in 1949. The Task Force has contributed a third set of three principles. We believe that these eleven principles will help carry MIT's mission into the next century.

1.6 The Founding Principles

Principle 1: The educational value of useful knowledge

The central principle of MIT's founding was the educational value of what William Barton Rogers called "useful knowledge." In a clear dissent from the common view of higher education of his day, Rogers believed that in an industrial society science and technology were legitimate foundations of higher knowledge, and that students would benefit from the motivation of striving toward a useful goal.1 Today, the value of education based on useful knowledge is accepted worldwide.

Principle 2: Societal responsibility

When Rogers founded MIT in 1861, one of his key principles was that "a place must be made for the young man [or woman] who wishes to apply the fruits of scientific discovery to the satisfaction of human wants."2 Employing "useful knowledge" to harness the power of technology was at the heart of MIT's important contribution to society in the latter half of the 19th century. Today, the goal of discovering and applying knowledge for the benefit of society remains at the center of MIT's mission.

Principle 3: Learning-by-doing

The principle of learning-by-doing was a third founding principle of MIT. Rogers believed that students should appreciate concrete conclusions drawn from factual data. He emphasized active learning through which students must seek out new information, thereby converting personal experience into knowledge.3 Since its founding, MIT has been a leader in the educational use of laboratories, shops and computational resources, as well as the inclusion of undergraduates in research activities. Today, MIT remains committed to the principle of learning-by-doing.

Principle 4: Combining a liberal education with a professional education

From its founding MIT has sought to provide a balanced education which combines professional education at the undergraduate level with components of a liberal education. Rogers believed that the development of technical proficiency was not enough, and that higher education ought to enable a person to participate effectively in "the humane culture of the community."4 An integral educational program that balances quantitatively or analytically based professional education with liberal education continues to be a principle of undergraduate education at MIT.

1.7 The Lewis Principles

Principle 5: Education as preparation for life

Education is more than intellectual development: as the Lewis Commission noted, "education is preparation for life."5 To provide students with an education that better prepared engineers to function as professionals, the Lewis Commission recommended that MIT broaden the curriculum and the create a School of Humanities and Social Science. The Lewis Commission recognized that the total environment in which a student's education takes place is important, and it remains so today.

Principle 6: The value of fundamentals

The Lewis Commission emphasized that a technical or professional education should be based on the fundamental principles in each field, quoting Rogers, who wrote, "The most truly practical education, even in an industrial point of view, is one founded on a thorough knowledge of scientific laws and principles."6 MIT has consistently strived to keep its educational programs focused on the fundamental principles which underlie the specific field of study. Keeping the curriculum focused and constrained has been a constant challenge. The continuing expansion of knowledge creates pressure to expand the curriculum. The information revolution exacerbates the need to focus on fundamentals. Because information will be cheap in the future, our students will need a fundamental basis to evaluate information and apply knowledge.

Principle 7: Excellence and limited objectives

The Lewis Commission articulated the principle of excellence and limited objectives to help guide the expansion of MIT that followed World War II. The principle was stated in three parts: "First, in accordance with Rogers' belief in the dignity of useful knowledge, the educational program has been designed at all times to fit men [and women] for direct contribution to the needs of the society of their day. Second, effort has been limited to fields that could contribute to or profit from an environment in which the predominant concern is with science and technology. Third, major activity has been confined at all times to those fields in which there appeared to be opportunity for the Institute to use its resources effectively." 7

Principle 8: Unity of the Faculty

One attribute that distinguishes MIT is a single Institute-wide Faculty. This unity of the Faculty is based on mutual professional respect and a shared educational responsibility. As the Lewis Commission stated, "there is a common Faculty responsibility for educational policy and operations in all phases of educational work at the Institute."8 The Commission affirmed that the entire MIT Faculty was responsible for the education of undergraduate students. The reasons for this are twofold: first to ensure that the undergraduate program is balanced, and, second, to ensure that the undergraduate program keeps pace with intellectual frontiers represented by the research activities of the entire Faculty.

1.8 Task Force Principles

Principle 9: An integrated educational triad of academics, research, and community

An MIT education should prepare students for life through an educational triad composed of academics, research, and community. Academics establish a place for rigorous study of the fundamentals of science, engineering, social science, and the humanities, as well as a format for developing problem-solving skills, familiarity with quantitative and qualitative analysis, historical and literary insight, and an

understanding of the scientific method. Participation in research develops both the foundation for professional competence and the opportunity for learning-by-doing. Through interaction with faculty and students within the community, students become familiar with the responsibilities of citizenship, hone communication and leadership skills, and gain self-mastery. Although each component of the triad is a distinct area of a student's education, the contribution of each reinforces and adds to that of the others. To provide a uniquely excellent education, MIT must bring students and faculty together to learn from one another through academics, research, and community

Principle 10: Intensity, curiosity, and excitement

One of the fundamental principles of an MIT education is the intensity, curiosity, and excitement which, in part, define the ethos of the Institute and propagate into all of its educational activities. Intensity, curiosity, and excitement are an important part of the MIT experience, and more than anything else they represent a shared rite of passage for its students and faculty. Although some aspects of the curriculum's pace and pressure should be examined and revised to ensure that student time is allocated wisely, MIT recognizes that the overall level of intensity, curiosity, and excitement represents a defining value of the Institute, and of an MIT education.

Principle 11: The Importance of Diversity

The Task Force believes that diversity of the students, faculty and staff of the Institute is critical to the educational mission. MIT has always been and should remain a meritocracy where intellectual achievement and capability are paramount. Within this context, diversity of the community will serve to enhance the educational experience through interaction and exposure of people with different experiences, beliefs and perspectives. This will become an increasingly important aspect of the educational experience as society and industry become more diverse and international. In striving to encourage diversity within its community, MIT must also strive to maintain an environment in which such diversity is appreciated and every student has a sense of place.

1.9 Conclusion

These eleven educational principles define MIT as an institution, and the mission statement developed here charts a general course for the future. In the following chapters of this report, the Task Force responds to its charge to evaluate MIT's educational processes and recommend changes to them.

STUDENT LIFE
& LEARNING

2

2.1 The Attributes of an Educated Individual

The central item in the Task Force's charge was to evaluate MIT's educational processes. In general, the purpose of higher education is to produce educated graduates, but what attributes will distinguish the educated individual in the 21st century? In consultation with students, faculty, and staff, the Task Force has examined this issue, and has found that the attributes of an educated individual fall into three broad categories: reason, knowledge, and wisdom. The following paragraphs capture these qualities and articulate the Task Force's vision for the ultimate goal of MIT's educational processes.

An educated individual possesses well-developed faculties of critical and rational reasoning. She understands the scientific method and other methods of inquiry and hence is able to obtain, evaluate, and utilize information to pose and solve complex problems in life and work. To this end, she has a strong grasp of quantitative reasoning, and has the ability to manage complexity and ambiguity.

An educated individual has a sound foundation of knowledge within a chosen field and has achieved some depth and experience of practice in it. At the same time, he is able to relate this knowledge to larger problems in society, and he has an appreciation for the interaction between science, technology, and society. An educated person is intellectually curious and motivated toward continuous learning.

An educated individual possesses the qualities associated with the best in the human spirit: a well-developed sense of judgment, an aesthetic sensibility, and the flexibility and self-confidence to adapt to major change. She has a knowledge of history and an understanding of the spectrum of human culture and value systems, and she combines this knowledge with her strong sense of judgment to think critically about moral and ethical issues. Her ability to communicate clearly and effectively enables her to work well with others and to employ all of the above attributes in making a positive and substantial contribution to society.

Many of the attributes of an educated individual are timeless, while others must be adapted to the social and technical environment of the current times. The paragraphs above also reflect the value MIT places on quantitative rigor and education based on useful knowledge. How can we help students develop the

qualities of the educated individual? The principles that have guided MIT in the past, combined with the three new principles outlined by the Task Force, must light the way.

2.2 The Central Finding

Given the challenge of helping students develop the qualities of the educated individual, it is appropriate that the Task Force was asked to examine the interaction between student life and learning. The Task Force's central finding is that the interaction among these elements of the student's experience is fundamental. The combination of structured learning and unstructured or informal education is critical because it enables us to educate the whole student. It is this very combination that results in MIT's reputation for providing a world-class education, as opposed to a merely skill-based or knowledge-based education.

The central and distinguishing feature of an MIT education is that it incorporates the three elements of its educational triad -- research, academics, and community -- into an education that is greater than the sum of its parts. The concept of the educational triad was first brought to the Task Force by students, which demonstrates the widespread recognition that the higher education of the future must go beyond classroom learning. As the Task Force's Student Advisory Committee writes, "The educational triad involves treating research, academics, and community as equal contributors to the education students receive here, integrating them as much as possible to create a coherent, unified educational product not available elsewhere."[9]

Although the combination of formal learning and informal learning already takes place at MIT, the relationship between them is sometimes undervalued in the way we think about education. The two are often treated as separate, perhaps because they tend to take place in different physical spaces and times, and they often involve different groups of people. Yet MIT remains a campus-based university, and the value of maintaining it as such lies primarily in the degree to which its students learn from one another. Collaboration among students and interaction with faculty, whether they take place in formal or informal settings, are the distinguishing qualities of the academics, research, and community activities that take place at a campus-based university.

In the future, information will pervade society. As the costs of providing a residence-based environment increase, and as distance-learning technologies become more effective, the importance of integrating the formal with the informal will loom larger, and MIT must be prepared for this change. The challenge is to use existing strengths in research, academics, and community to better accomplish the integration that is essential to the future.

2.3 Conclusion

The Task Force's substantive findings and recommendations are presented in the following three chapters on academics and research, community, and strategy and structure. It has been necessary to present the material relating to the three elements of the triad in two separate chapters for the sake of

readability. However, in the spirit of integrating the learning that takes place in all parts of the triad, the Task Force emphasizes that the following findings are all intricately interdependent. The ultimate goal is to bring students, faculty, and staff together in pursuit of the common educational enterprise, and doing so entails recognizing the relationship between what happens within the classroom or laboratory and the informal learning that takes place outside.

ACADEMICS & RESEARCH

3

3.1 Vision

The Task Force believes that MIT's educational principles can and must be adapted to meet the new needs of its graduates. An education grounded in the fundamentals of science and engineering remains the best preparation for further professional study and development. Combining a liberal education with technical education, and providing education through research, academic study, and participation in the community, will continue to create new avenues for the intellectual development of students while maintaining MIT's excellence in its core fields.

3.2 Findings: Changing Needs

1. Changing career trajectories

Perhaps the most compelling argument for change at MIT stems from the dramatically different roles its alumni play in society as compared with the role of graduates in decades past. In the past MIT has sought to deliver a professional education through the undergraduate curriculum. Today, however, most undergraduates do not treat a Bachelor of Science as terminal degree; more than 60 percent go on to seek further degrees.10

At the same time, career paths for our graduates are more varied than ever before. Engineering is becoming an integrative and global profession, requiring skills in management and economics, as well as understanding of other cultures. In fields beyond pure science and engineering, MIT's graduates are increasingly in demand for their analytical skills and problem-solving abilities. This demand has attracted many more Ph.D. recipients to careers in business, law, or public policy than in the past. Even bachelor's degree recipients have also been in increasing demand for non-traditional jobs by an economy that puts a premium on problem-solving ability, good judgment, and leadership.

It goes without saying that the increasing demand for MIT's graduates has been a blessing, but it also raises new questions. Should MIT still attempt to provide a professional education for undergraduates in four years? How should undergraduate and graduate curricula be altered to provide the broader skills

demanded by students and society? Are faculty adequately prepared to advise students who may well end up in professions far afield from their academic experience? Some of these questions are addressed in this report, whereas others will require more detailed examination by others.

2. Changing demands for skills

MIT has a well-established and rightly-earned reputation for teaching problem-solving and analytical skills. Like most engineering-based educational institutions, MIT has been criticized for not providing adequate preparation in skills like teamwork, communication, and leadership. Many alumni report that we have failed to help them develop the skills necessary to apply their intellect effectively.[11] While the informal development of curricula to improve writing, communication, and team skills has worked for many students, much remains to be done. As MIT's bachelor's and advanced degree recipients play new and more diverse roles in society, their need for communication and team skills will only increase. Individual departments have begun to recognize this need, and some have offered more subjects that include team-based problem solving and elements that emphasize the ability to communicate effectively.

3. Pressures to expand the undergraduate curriculum

An educational program designed to develop the qualities of an educated individual cannot, within the limited time of four years, endow them with fully realized professional competence. An MIT education must not attempt to impart knowledge of as many facts of professional practice as possible, but rather impart fundamental knowledge that supports a life-long self-education. The motto "Less is More," coined by the architect Mies van der Rohe, can be a guide to the design of undergraduate curriculum. A limited number of fundamental concepts and professional topics well learned and understood serve the future professional better than a multitude of facts briefly covered.

Although MIT is dedicated to the principles of excellence and limited objectives and a curriculum rooted in the fundamentals, internal and external forces create pressure for expansion of MIT's curriculum. Undergraduate programs at other major universities have gradually expanded their requirements and offerings in mathematics, science and engineering -- traditional MIT strengths -- leading to increased competition for the best students in these areas. Many MIT faculty members wish to include a wider variety of subject material in their classes and departmental programs to keep pace with professional developments in their fields. Both of these pressures are healthy ones; there is no question that MIT must continually reevaluate its core offerings in the context of students' professional needs.

At the same time, however, it is more difficult to prune topics or requirements than to introduce new material. As departments and subjects introduce new topics without necessary adjustments, pace and pressure increases and the overall structure of the curriculum is damaged. Unchecked curricular expansion is at odds with MIT's commitment to excellence and limited objectives, and to teaching the fundamentals of science and engineering. To deliver the best education, MIT must remain focused on the fundamentals, adjusting topics and preventing increases in courseload. MIT must continually assess and revise its whole curriculum, rather than adding requirements piecemeal.

3.3 Findings: Formal Education

4. The General Institute Requirements

MIT's undergraduate curriculum begins with the General Institute Requirements, or GIRs. The GIRs serve several purposes: they provide a background in the fundamentals of science and the humanities; they represent a shared cultural experience that helps define the MIT community, and they provide exposure to a variety of problem-solving methods. A major strength of the current GIR system is its balance between subjects in the humanities, arts, and social sciences, and subjects in mathematics and the physical and life sciences. The balance between these broad groups embodies MIT's commitment to combining a professional education with a liberal education. The balance of formal requirements serves MIT students well, although there is room for improvement in terms of the degree of intellectual commitment students make to non-technical subjects.

At the same time, however, the actual content and structure of the GIRs are not timeless: changes in the way scientists and engineers understand the world demand that the GIRs be continually reviewed and updated. In general, reviews of the GIRs -- whether of the HASS or science curricula -- should ask how well the current subjects contribute to the development of the educated individual. When MIT added the requirement for one subject in biology, it recognized the increasing relevance of the biology in society, and the new demand for graduates who have knowledge of this growing field.

Another societal change that the GIRs have hardly begun to account for is the increasing use of computers in science, engineering, and society. Today's students arrive on campus with far greater proficiency in computers than in the past, and most find ways to update and perfect their practical computer skills through the departmental programs. Computers are now indispensable to answering questions in science and engineering, and the science GIRs should respond to these developments to maintain their strength.

5. Educational technology

What is the appropriate role for new technology in teaching at MIT? There are many unrealized opportunities for enhancing presentations of new concepts via images, graphs, delayed viewing of lectures and lecture demonstrations, and via participation of students from other universities in joint projects, all of which modern technology can provide. Foreign-language subjects and some of the humanities subjects have taken advantage of the versatility of new computational tools. The future will bring library resources, course materials, and instructional tools online, and MIT must be prepared to take advantage of these capabilities. Even further, computers can help people come to terms with difficult, abstract visual problems.

At the same time, however, we must not devalue human interaction. Other universities have the capacity both to compete and cooperate with MIT in offering learning based on educational technology such as distance-learning. MIT's contribution will be the way it brings together the best people with the best

technology to produce excellence in education. We must focus on this goal, rather than on the technologies themselves.

6. Teaching innovation

The MIT Faculty is deeply committed to excellence in teaching. With respect to teaching, the research university has both great advantages and disadvantages. Through research, faculty members gain insight into the questions at the frontiers of their fields, enabling them to build this excitement and focus into their teaching and coursework. At the same time, however, information about educational experiments and teaching innovation is not adequately disseminated Institute-wide. In our discussions about educational innovation with faculty throughout the Institute, we found that many exciting experiments were taking place, including a number of subjects that emphasized team-based learning and interdepartmental teaching. However, very few of these are being assessed, recorded, and communicated to other faculty. There is a need to create and support an environment of sharing and analysis of educational innovation.

7. The first year

One problem with the current undergraduate curriculum is the perceived lack of enthusiasm and excitement in the first-year program. Many students who come to MIT with exciting goals and ambitions rapidly become disillusioned about the education they receive here. There are undoubtedly multiple explanations for first-year cynicism. For some, MIT represents the first exposure to hard work. For others, the steady flow of problem sets presents a stark contrast to their expectations of working on interesting projects and to the dreams they came to MIT to fulfill. The large lecture format of many subjects, combined with the small amount of interaction between freshmen and faculty, means that many students have few opportunities to overcome the initial perception that MIT is about drudgery and requirements rather than the thrill of discovery and progress. Finally, many have complained that some of the material in the freshman core is presented in a dry and uninteresting way. Increasing the level of excitement in the first-year program should be a priority in the design of the undergraduate program.

8. Research

Exposing more students to research and laboratory experience at an earlier stage represents one way to increase the level of interest in the first-year program. Research is central to what MIT is about, but many students do not have real research experiences until late in their undergraduate studies, if then. Indeed, incoming students have had less hands-on laboratory experience in high school than students of a generation ago; they may be more comfortable with computers and calculus than with measurement error or the experimental method. Exposure to research is one way to overcome these deficiencies while adding to the student's overall experience.

There is substantial reason to conclude that bringing research into the curriculum at an earlier stage would improve undergraduate education. Earlier this report discussed the principle of the educational

triad of academics, research, and community. In the future, emphasis on the interaction between learning that takes place in these three areas will differentiate MIT's educational product from learning available elsewhere. Studies have shown that students who have had intense interpersonal relationships organized around solving research and academic problems are the most successful.12 Since its founding MIT has provided its students with hands-on laboratory experience, and more recently the Undergraduate Research Opportunities Program (UROP) has provided students with rewarding real-life research experience. Design experiences have also played an important role in undergraduate subjects and in undergraduate life: 2.70 (now called 2.007), 6.270, hacks, and the Tech Model Railroad Club are all legendary for bringing students together to solve design problems and have fun at the same time. Today's challenge is to make research and design experiences an integral part of the undergraduate experience at the earliest possible stage.

9. Management education

More than ever before, students with scientific and engineering training eventually seek positions of managerial and operational authority. The preparation MIT students receive for these roles has not kept pace with the demand. Those in managerial positions require more than technical training in management subjects: skills in communication, problem-solving, and intellectual curiosity are all important. Recently, students have also expressed the desire to obtain backgrounds in the fundamentals of management. In discussions with faculty and students, we learned of the difficulty that students have in enrolling in management subjects, because of the disparity between demand and teaching resources. The Task Force believes that the interest in management subjects has not peaked. Bringing management education into the undergraduate curriculum in a more substantial way is consistent with the principle of the unity of the Faculty. All schools must contribute to the undergraduate program if this principle is to be upheld. In this case, the needs of our students demand it.

3.4 Findings: Informal Settings

10. Informal learning

In many ways, informal learning plays a bigger role in defining an MIT education than the formal curriculum does; hence it is of utmost importance that MIT have an appropriate impact on this type of learning. Informal learning acts as a link between the three areas of the triad. Students who live, study, and work with one another realize the richness of the benefits offered by bringing together academics, research, and community in one place.

At MIT we are tempted to modify the tangible aspects of the curriculum, both because these are easier to grapple with, and because time is in short supply. However, informal learning takes place beyond the realm of the structured curriculum: at meetings between advisors and advisees; at social occasions among tutors, housemasters, and students; at late-night work sessions in the laboratories and computer clusters; and in the evenings in residential common spaces. Through informal, unstructured activities students set priorities and goals, learn the value of intellectual flexibility, make choices about career

paths and future learning, and decide what to do with the rest of their lives.

11. Advising

Advisors and mentors who interact with students in all three areas of the triad unify the learning that takes place in each. Yet MIT has precious few advisors who are able to bridge the gaps between research, academics, and community. Students see problems with advising as MIT's greatest weakness, although it is a weakness MIT shares with its peer institutions.13 Academic advising, career services, counseling services, research, and community activities remain largely separate, whereas they should work in concert. Faculty-student interaction -- and advising in particular -- will have to move away from the classroom and office, and into the physical spaces in which research, community activities, and studying take place if the informal connection among academics, research, and community is to be strengthened.

3.5 Academics & Research Recommendations

1. Expand the Undergraduate Research Opportunities Program (UROP), and institute a system of Freshman Advisory Research subjects (FARs) to include offerings from all academic departments.

MIT should set a goal of involving 100 percent of undergraduates in research experiences sometime during their four years on campus. Student participation in MIT's research enterprise is consistent with the principle of learning-by-doing, and is essential to implementing the principle of the educational triad.

To help reach this goal, MIT should institute a new program of Freshman Advisory Research subjects (FARs). The FARs should help increase excitement in first-year program, introduce students to various disciplines, and provide departments outside the first-year program with the opportunity to meet incoming students. Faculty members responsible for teaching FARs should design the experience to be both educational and participatory.

UROP should also be expanded to help meet the target of 100 percent undergraduate participation in research. The program should receive adequate resources from the Institute in terms of funding, staff support, space, and coordination. Providing these resources will enable more faculty members to participate in the program.

2. Provide formal recognition for undergraduate involvement in research, and for faculty participation in research activities involving undergraduates.

In addition to the goal of involving 100 percent of undergraduates in research at some time during their time here, MIT should provide formal recognition for that involvement. There should also be recognition for faculty involvement in programs such as UROP and Freshman Advisory Research subjects. Participation in such activities should be considered in the tenure and promotion process as part of a faculty member's teaching record, and departments should credit faculty members for their

involvement.

3. Strengthen the advising system by creating collaborative advising teams.

At MIT, an advisor should be more than a source for suggestions about a student's subject selection: an advisor should be a source of information and guidance about life. Separating academic advising from the stream of students' lives creates an artificial boundary between academics and the rest of the world. To overcome this obstacle, MIT should create advisory teams that can refer students to those most qualified to handle questions related to field and subject choices, career paths, and life decisions. Teams might be composed of faculty, qualified graduate students, academic administrators, and other staff members. Where possible, alumni should play a role within the advising system. Advising should be a collaborative venture: advisors should meet regularly to compare experiences and challenges. Finally, advisory teams should be coordinated and supported with appropriate resources.

4. Institute a system for continually reviewing the undergraduate program.

MIT should institute a regular system of reviewing and updating the undergraduate program. This implies that the GIRs should be examined on a continual basis. Such reviews should seek to adapt MIT's curriculum to the changing needs of society. To cope with changes in particular fields, departments should assess their programs to insure that they remain focused on fundamentals, removing or condensing less important material as new topics become relevant. Finally, today's greatest challenge is to invent ways of integrating MIT's traditional academic program with the learning that takes place within the community and research elements of the educational triad. Doing so will require experimentation, a point that leads directly into the next recommendation.

5. Encourage educational experimentation, especially in the areas of the General Institute Requirements.

The Committee on the Undergraduate Program (CUP) and the Committee on Curricula (COC) should adopt practices which encourage educational experimentation, such as in the creation of alternative GIR subjects and in the integration of educational technologies. The review and approval process for educational experiments should be liberal in allowing faculty to try out new ideas, but should require assessment and dissemination of results during and after the experiment period. Many successful experiments are not well known and are often re-invented by faculty in other departments or schools. The COC should therefore keep records of experiments and publicize the successes -- in an annual review of educational experiments in the Faculty Newsletter, for example. For this purpose, resources should be made available to enable assessment and dissemination of results to the faculty.

6. Conduct carefully designed experiments in distance learning and educational technology.

Communication links are improving dramatically while their cost is falling. It is not a question whether MIT as an educational institution should be involved in distance-learning and educational technology,

but rather how much more and in what new areas. Experiments with educational technology should serve students on campus -- giving them access to lectures, demonstrations, and course Web sites in residences -- as well as students off campus on cooperative assignments. It is important that MIT develop distance learning methodologies in a rational and controlled way, of the quality commensurate with MIT's principle of excellence and limited objectives. In view of the still rapidly evolving technologies, a committed, yet cautious, process of experimentation, evaluation, and dissemination is the proper course of action.

7. Ensure that management subjects are available to all members of the general student body.

An extraordinary effort should be made to allow any student who wants to take management subjects to do so. MIT should ensure that adequate staffing for undergraduate management subjects is provided. Lotteries for management and management-related subjects should be replaced with open enrollment, subject to relevant academic prerequisites. In addition, MIT needs to examine ways of working communication and organizational skills into the curriculum across the Institute.

COMMUNITY

4

4.1 Vision

The word "community" has many connotations, each appropriate to its own sphere. Even at MIT the word has taken on a variety of meanings: there is the student community, the faculty community, and the MIT community -- the latter including everyone from alumni to the immediate families of students and faculty members. Before presenting the Task Force's findings on community, the term must be defined. Here the term has a specific meaning: "community" refers to students, faculty, staff, and alumni who have come together on campus for the common purpose of developing the qualities that define the educated individual. Establishing a critical mass of intelligent people dedicated to excellence in everything they do is central to MIT's mission. Each of us is an example to our peers and colleagues; through professional, recreational, and social interaction with one another we build a culture of discovery and learning that distinguishes MIT from other universities. Hence informal personal interaction can be considered the life of the "community": student activities, casual social get-togethers, cultural events, and daily encounters with friends and colleagues are a few general categories of such interaction.

If the goal of an MIT education is to develop the elements of reason, knowledge, and wisdom that characterize the educated individual, MIT cannot rely on structured learning alone. In the past, MIT has drawn upon the research university model of Von Humboldt, who proposed educating students by exploiting the informal interaction between research and academic study. In the future, the third element of the triad -- community -- will play a larger educational role.

Two forces are driving this change. First, informal learning-by-doing through peer interaction at the community level can properly develop in students many qualities of the educated individual. Community interaction is an excellent preparation for life: paired with MIT's formal curriculum, it is a means to develop communication skills and the ability to think critically about societal issues, and it provides experience with cultural and intellectual diversity. Second, the accelerating changes of the information revolution are eroding the boundaries of place and organization. To add value to a technical education available elsewhere, MIT will increasingly have to rely on the value it can deliver by combining informal, community-based learning with structured, curriculum-based learning. The challenge facing MIT is twofold: First, how can we do more within the community we have? Second, how can we unite the learning that takes place in the community with the learning available elsewhere?

4.2 Findings: Strengths

MIT's present community has many strengths MIT should draw upon in an effort to augment its educational value.

1. Loyalty to Residence

A prominent feature of MIT's community is the strong feeling of loyalty that undergraduate students express toward their MIT residences or living groups. Residences at MIT are not just places of repose: in undergraduate life they are the central unit of student organization, and they act as a haven for social, cultural, and intellectual exchange among students. In surveys, students express a remarkably high level of satisfaction with their residential experience, particularly with the fraternities, sororities, and independent living groups.14 Residences also provide a strong academic and social support group. Students from multiple graduating classes share the same living group, providing valuable opportunities for advising and mentoring.

2. Independence of Community Groups

The community ties that have arisen at MIT have done so with little conscious design or plan, and they have remained largely self-sustaining and autonomous. In its commitment to individual responsibility, free choice, and self-governance, MIT's community resembles society at large in many respects. Undergraduate students, who come to the Institute at a critical point in their personal development, benefit from the gradual but intense exposure to the independence and responsibility expected of them here. By interacting with their peers and colleagues within a framework of independence and interdependence, MIT students help fulfill the Institute's principle of learning-by-doing.

3. Diversity of Existing Community Groups

The large number of activities and groups is another strength of the MIT community. These include social activities tied to departments and living groups, performance and artistic ensembles, cultural societies, political groups, student government, community-service groups, athletic and recreational activities, student publications, and many other activities. The dedication and commitment displayed by students and faculty who participate in community activities is impressive given the demands of research and academics, and this dedication is more impressive given that such activities often go begging for funds and are seldom promoted outside their own venue. That such a system has evolved at MIT is a testament to the drive and diversity of interest found among those who are drawn to the Institute.

4. Athletics

MIT has demonstrated a positive and ongoing commitment to providing facilities, resources, and staff to

maintaining a strong number of athletic activities. Partly as a result of this commitment, athletics play a powerful role in bringing students and faculty from across campus together in activities that teach teamwork, build self-confidence, and encourage perseverance, dedication, and personal fitness. MIT is now committed to building new athletic facilities, and to continuing its commitment to ensuring all MIT students have the opportunity to participate in athletics on campus. Overall, MIT's commitment to athletics plays an admirable role in fostering interaction among diverse members of the community.

5. MIT Staff

Although this report's findings focus primarily on faculty and students, it is important to remark upon the educational role played by MIT's dedicated staff members. Staff excellence is an integral part of today's MIT community. Across the Institute, in departments, programs, and administrative offices, staff members manage and run programs that contribute directly to student life and learning. Many staff members as advisors and mentors to students, and MIT's staff as a whole contribute to the Institute's educational mission in ways that go beyond their administrative functions. The Task Force has met and worked with numerous MIT staff members in the past two years, and this has reinforced the Task Force's feeling that staff play a tremendously positive role in keeping the MIT community together.

4.3 Findings: Weaknesses

At the same time, many obstacles stand in the way of integrating the educational benefits of community activities with more structured learning.

1. Faculty Commitments

All activities at the Institute, including undergraduate education, revolve around the simple fact that MIT is a preeminent research university and a national and international resource. Research, teaching, professional commitments, family, and governance all result in significant time pressure for faculty. Time pressures have negative implications for interaction among faculty members, and there is little recognition of faculty who participate in community activities. There is a tendency for most faculty to treat community activity as the residual left over when everything else has been done.

2. Student Commitments

Students are equally beset by the time pressures of academic study. With little positive incentive to go beyond the Institute's academic requirements, students may conclude that "extra-curricular activities" are indeed extraneous and dispensable. This is not to say that students do not participate -- they do. But although student participation in community activities is high, students may take these activities less seriously than if they were held in higher esteem.

In addition, entering students are presented with an abundance of choices and demands upon their time. It is the responsibility of MIT to communicate opportunities in a way that helps students manage their

time effectively. Students should be inspired, not overwhelmed, by the opportunities presented to them.

3. Weak Campus-wide Community

Another possible obstacle to integrating formal and informal learning is the weakness of the campus-wide community. Many social interactions on campus take place in living groups, departments, or laboratories. Graduate and undergraduate students have few opportunities for informal interaction with each other, and students and faculty have even fewer. There is a sharp divide between the graduate student body and the undergraduate student body. Finally, MIT lacks a strong sense of Institute-wide faculty collegiality: faculty members have relatively few opportunities to interact with their colleagues in different departments.

The strength of MIT's diverse sub-communities has already been noted. However, the defects of the current situation are notable. First, the Institute's support structures have become fragmented and crisis-oriented. While many students receive ample interpersonal and professional support, many others fall through the cracks. Second, the divisions among campus groups -- such as among living groups, or between graduates and undergraduates -- sometimes leads to intolerance and lack of understanding not in keeping with MIT's principle of diversity. Third, the physical design of the campus, which has evolved around its nuclear academic, community, and research groups, lacks space for community-wide interaction.

4. Orientation

It is through orientation that the existing community passes on its values to its newest initiates. Yet MIT lacks an effective orientation for all segments of the community. In general, undergraduate orientation concentrates too heavily on living group selection: the way undergraduates are asked to make immediate choices about living arrangements obscures larger choices and more important values. By and large, the current system of undergraduate orientation detracts from the sense of an overall community at MIT, and discourages faculty-student interaction. At the same time, entering graduate students receive a truncated orientation to the educational mission of MIT, new faculty do not always appreciate key cultural and historical features of the Institute, and new staff members often do not get the sense that they are entering into the support of an educational enterprise. MIT is a special place, with a distinct mission, history, and culture. Yet as the Institute has grown and become more complex, the mechanisms to transmit the sense of MIT as a whole community have atrophied.

5. Campus residences

A shortage of housing for both graduate and undergraduate populations has also presented difficulties. On the graduate side, although 50 percent request on-campus housing, only 30 percent can be accommodated. Recent increases in Cambridge housing prices have negatively affected the ability of MIT to compete for graduate students. In addition, a significant subset of graduate students desire a more programmed residential experience: the thoughtful programs that exist at Ashdown House are an

example of how to bring about a strong sense of community among graduate students. Such housing is closely aligned to MIT's educational mission. In all cases, graduate student housing should be designed with close access to MIT's academic and research communities in mind, as well as access to junior and senior faculty.

MIT has long acknowledged the special value of the housing system for undergraduate education.15 However, the educational mission of the housing system has been hampered by a lack of resources and programs. Crowding has been a particularly acute problem. On-campus housing has remained crowded despite new construction over the past few decades. In general, the undergraduate system has lacked the flexibility needed to address on their merits issues concerning the design of orientation and first year housing. The system has barely coped with routine renovation and maintenance. Related programs such as dining and community spaces have also lacked resources, with negative consequences for the housing system.

6. Dining

The dining system is another setting in which community is created and sustained. Yet much of the dining system at MIT has been allowed to languish. Some of the dining spaces in the residences have been closed, and the remainder of the system is operated with a view to cutting costs rather than bringing people together. Yet some parts of the dining system have been successful at creating community, even in a small way. The well-designed Architecture and Planning Cafe attracts students, faculty, and staff who might have been tempted to eat lunch at their desks to a pleasant but informal common setting. The dining space at Walker Memorial brings many faculty, staff, and students on the east side of campus together. And personal cooking spaces within the residences, while they bring together smaller groups of people than dining halls, serve their function adequately. In terms of bringing diverse groups of people together, however, the dining system remains a largely underutilized resource.

7. Community Space

MIT has demonstrated a weak commitment to providing attractive and convenient space for community interaction. The lack of space for some activities, such as the performing arts, has had spillover effects with adverse consequences for other parts of student life. The degree to which students regard computer clusters as social space is symptomatic of the lack of areas where faculty and students can interact and work together. Construction of new community space, including performance space and athletic facilities, student activity space, and general event space would help MIT remain competitive in attracting top students and relieve pressure on an otherwise overloaded system.

8. The Performing Arts

The lack of space for the performing arts has been an issue both for the arts, and for student life in general. The performing arts serve a number of important educational functions. They provide a venue for community interaction, centered on cultural enrichment and enjoyment. Student participation in

these activities is one avenue for learning-by-doing, and it enriches the cultural life at MIT. Yet the decreasing availability to students of performance and rehearsal spaces impairs the Institute's ability to create a rich, nurturing, and consistent educational experience. Faced with increased competition for Kresge Auditorium, large groups such as the MIT Symphony Orchestra and the theater groups must now reserve Kresge three years in advance. Given current projections, in five years Kresge will have to be reserved four or five years in advance -- before the students who will use it even graduate from high school. Short of performance and rehearsal space, many performance groups have taken over space intended for student activities, putting additional unwarranted pressure on student activities space.

Performing programs have proven their value to the MIT educational experience by drawing together the wider MIT community, breaking down social barriers, and providing opportunities for self-expression, growth, and leadership. Their excellence attracts students who have been accepted to the finest arts schools in the country. Failure to address the problem of lack of performance space will undoubtedly affect the quality of performance programs and their ability to attract students and maintain faculty.

4.4 Findings: The Future

Bringing the community side of the triad to the same standard of excellence as research and academics requires a new commitment to community by MIT. Just as MIT's high-quality teaching and research enterprises are sustained, the successful contribution of community life to education requires MIT to marshal three types of resources -- physical, human, and programmatic. For it to stand alongside teaching and research as part of the educational triad, the Institute must ensure that the resources devoted to community involvement are first-rate and suited to the task of educating MIT students.

Of the many difficult design problems MIT faces, promoting student and faculty participation in community activities is probably the most difficult. Nevertheless, given the goal of developing in students the attributes of educated individuals, the Task Force finds that the responsibilities of the faculty include participation in community, balanced properly with research and teaching. Student and faculty participation in community activities should be recognized along with achievements in academics and research. It is the responsibility of the Institute as a whole to ensure that the residence system (both graduate and undergraduate), dining arrangements, orientation programs, and physical layout of the campus encourage faculty-student interaction.

4.5 Community Recommendations

1. Recognize faculty members and students who become involved in community activities.

If participation in the community is to become an integral part of the MIT experience, in accordance with the principle of the educational triad, the Institute must explore ways to recognize participation in the community appropriate to its educational role. Increased contact between students and faculty can help: students' priorities are partly determined by shared cultural values that can be transmitted through

informal interaction. There is also a need for formal recognition. MIT might recognize student participation by listing selected activities on student transcripts. There should also be recognition for faculty participation in the community. For faculty, involvement in the community must be considered a part of good teaching. Community participation should be considered in the tenure, promotion, and performance review process as part of a faculty member's teaching record.

2. Make the residence system an integral part of MIT's education, and approach the issues of housing, dining, the first-year program, and orientation as part of a single educational program.

The residence system is at the heart of the MIT community. If MIT is to unite the three areas of the triad, it must inevitably begin with a conscientious approach to the design and programming of the residence system. The physical design of new housing, the advising and support structure within the residences, the dining system, the first-year program, orientation, and provision for new graduate, undergraduate, and faculty housing are all interdependent. A strategic approach to these issues is essential to making MIT's educational triad work; if they are approached separately, MIT will ultimately fail to bring about a coherent integration of community with research and academics.

To maximize the housing system's educational value, housing facilities for graduate students, undergraduates, and faculty should be properly supported with Institute funds. Costs associated with improving the housing system should be considered in terms of educational value in addition to customer service. This implies construction of new undergraduate and graduate housing -- projects that have been delayed for too long. In general, the housing system should be flexible enough to address issues related to undergraduate education on their merits.

3. Phase in a system in which all undergraduate students are housed in residence halls during the first year.

A housing system in which all freshmen live in residence halls has distinct advantages, including the opportunity to build up the sense of an Institute-wide community through first-year programs, as well as to unite the three elements of the educational triad. It would encourage students to familiarize themselves with the MIT experience as a whole while developing ties to a residence. Combined with a well-designed first-year program and increased faculty-student interaction, housing freshmen in residence halls also offers a way to ease the transition to life in the MIT community. The need for a transition to life at MIT has long since been recognized in academics, where the design of the core curriculum, advising, and grades all help ease the transition to MIT's academic program.

As has been noted, however, the current system of housing in fraternities, sororities, and independent living groups (FSILGs) has many strengths. By providing more housing options, MIT makes room for the diversity of student tastes and needs. Smaller living groups such as FSILGs provide different ways of giving students intellectual, academic, and emotional support, as well as creating different venues for developing a strong sense of community. If we do not take care to preserve these strengths during the transition, housing all freshmen on campus could result in a system much worse than today's.

To preserve the strong community spirit developed in the existing FSILG system, MIT should take steps to enable its FSILGs to survive as residences. In the short term, it may be necessary to provide some temporary financial support to FSILGs to offset lost occupancy.

Housing freshmen with older students provides incoming students with academic and emotional guidance and support, as well as a ready supply of role-models and mentors. For this reason, incoming students should be placed in the same residence halls as older students, rather than in a residence constructed exclusively for freshmen. In addition, MIT should take steps to bring advising -- particularly freshman advising -- into the residences to provide broader intellectual and professional support in an informal setting.

4. Make orientation about bringing undergraduates, graduate students, and faculty together into a shared experience.

The central purpose of orientation should be to create the feeling of joining a single, campus-wide community. Freshman orientation should consist of a program that continues throughout the first year, and should be filled with experiences that establish a connection between incoming students and experiences in academics, research, and community. To do this, there should be more activities that involve faculty, graduate students, and undergraduate students in shared experiences. In all parts of orientation there should be an equal role for academics, research, and community. Orientation events must be more than pro forma exercises to be endured. If each orientation experience has a constructive purpose, students could be expected to take them seriously.

5. Design the housing system to better encourage faculty-student interaction.

The housing system should enable and encourage faculty-student interaction. Ideally, informal faculty-student interaction over topics related to academics, research, and community should take place across campus, in nearly every space inhabited by students and faculty during the course of the day. For this to take place, MIT must take every opportunity to encourage faculty to interact informally with students in the residences, and appropriate common spaces should be available to make this possible.

The issue of faculty and staff housing is critical both for MIT's competitive situation and for the creation of a lively community on the MIT campus. Given the time pressures experienced by both students and faculty members, informal interaction is more likely to occur among faculty members and students who live near one another. All new student on-campus residential construction and renovation should include provisions for increased faculty housing, in addition to housemaster accommodations, to seed a more active on-campus intellectual community after hours. The Task Force expects that on-campus housing will be most attractive to junior faculty, senior faculty, visiting scholars, and other scholars who are new to MIT and have limited family obligations. The Institute should also explore strategies for encouraging more MIT faculty to live in Cambridge and adjoining sections of Boston.

6. Design the dining system to encourage community interaction.

The dining system offers one of the most attractive venues for fostering a greater sense of community at MIT. It goes without saying that a university's dining system should provide healthy, attractive, and affordable dining options. MIT's system should do more: it should be run with the goal of bringing people together for informal social interaction. Ways to encourage this interaction include reopening the dining halls in the residences where they were closed, designing and maintaining of cooking facilities to encourage interaction, and constructing new dining facilities in common spaces throughout campus where people are likely to congregate and socialize.16

Residential dining halls should be used actively to promote small-scale, informal community activities. The Dean's Office should coordinate the invitation of faculty and administrative staff to informal dinners where students might explore topics like choice of major, choice of careers, and discussions of current events. The Dean's Office should also explore strategies for encouraging faculty and administrative staff to periodically eat dinner in the residential dining halls as an effort to break down social barriers among students, faculty, and staff.

7. Provide more attractive and convenient spaces for community interaction.

All programs aimed at bringing faculty and students together over academics, research, and community activities will ultimately fail if there are not enough attractive spaces for such interactions to occur. MIT's design should encourage faculty and students to linger in areas they visit in common. All aspects of MIT's design -- from laboratories, classrooms, and office areas, to dining, performance space, library space, and housing -- should include space for informal interaction. Wherever possible, spaces for formal and informal activities should be intertwined.

Above all, more resources should be devoted to creating new common spaces and retrofitting existing facilities to create common space. Priorities should include building more performance space, bringing more casual dining options into areas where people might congregate, and creating space for informal faculty-student interaction in the residences.

8. Provide more funding for activities that encourage community interaction.

As has been noted, MIT has many strong groups that play an important educational role in today's community. Participation in community activities can serve as a means to bring students and faculty together in informal settings. Providing student activities and other community groups with appropriate funding is consistent with MIT's educational mission.

STRATEGY & STRUCTURE

5

5.1 Vision

During its review of MIT's educational processes, the Task Force has identified several fundamental strategic and structural dilemmas that must be addressed for MIT to fulfill its educational mission. The President has recognized some of these problems, and it has responded by appointing a Chancellor who will assume much of the responsibility for implementing and overseeing MIT's strategic educational vision. Because so much of this report's recommendations relate to the problems with MIT's current structure, the Task Force has chosen to present its findings regarding these issues under a separate heading, along with recommendations for how MIT might proceed.

5.2 Findings: The Structural Dilemma

The central structural dilemma at MIT lies in the tension between Institute-wide objectives and the heretofore largely independent schools and departments. Many of MIT's organizational problems can be traced back to tensions created when management and resources need to cross organizational boundaries.

1. Strengths of departmental management

Schools and departments are adept at allocating resources, fostering excellence in research, building new graduate programs, and designing rigorous undergraduate departmental curricula. Because resource allocation largely falls to departments, they must practice a version of MIT's principle of excellence and limited objectives internally by expending staffing and financial resources in areas where they can be most effective.

Moreover, departments bear the heavy responsibility of maintaining the reputation of their own research activities. This demand impels departments to seek out the best faculty, and also helps them design graduate and undergraduate curricula to meet the current needs of the field. This advantage of departmental management is crucial, because ultimately the continued success of MIT depends on its reputation. MIT's reputation for excellence in research and education allows it to attract students and

faculty who will continue to enhance MIT's reputation for the future. This positive feedback cycle of excellence in students, faculty and reputation is MIT's most precious asset.17 While the principles that guide the design of an MIT education are important, they cannot succeed if MIT ceases to attract the best students and faculty.

While much of MIT's reputation for excellence in research arises from the entrepreneurial activity of the departments and laboratories, most of its educational reputation derives from more central qualities such as the overall caliber of the faculty and the rigor of MIT's curriculum. Because MIT cannot afford to let its overall reputation falter, it must strike the appropriate balance between independence and coordination in its research and educational activities.

2. Weaknesses of cross-departmental activities

Unfortunately, important educational programs that demand constant management, assessment, resources, and decisive action often fall between departments. The needs of the undergraduate program transcend departmental barriers. The first-year program and the General Institute Requirements (GIRs) are currently shared among departments, administrative offices, and faculty committees. The balance between undergraduate and graduate education is trapped in the middle of Institute and departmental governance structures. Other issues that should be treated as common Institute problems are treated in isolation. Five-year programs leading to Bachelor's and Master's degrees are almost entirely handled by individual departments, often creating tremendous logjams for students attempting to meet both Institute and departmental curricular requirements. On the undergraduate side, some departments contribute to undergraduate education through curricular offerings while others contribute more indirectly. In the future, efforts to integrate the three aspects of the educational triad will face obstacles to crossing departmental and administrative boundaries.

Some pieces of the strategic puzzle seem to fall outside of all administrative and departmental structures. The complex and overlapping faculty governance structure was identified as a problem by the Lewis Commission 50 years ago, and the situation has not improved since then. The current system of faculty committees is beset by a number of weaknesses. Turnover is one dilemma: the chairs rotate so frequently it is difficult for the committees to undertake projects of any significant time-horizon. The number of committees is a source of confusion, as is the apparent overlap in committee goals. The faculty governance structure as a whole lacks adequate resources to accomplish its mission, although recent efforts to consolidate committee support staff into a single office will help.

Faculty-student interaction, which is essential to integrating the three areas of the educational triad, also falls outside of the existing management structure. Faculty members who get involved in community activities usually do so for personal satisfaction. In general, faculty-student interaction is not rewarded unless it contributes to immediate departmental or research objectives. Without any incentives, programs, or spaces for faculty-student interaction, most faculty and students do not have time to engage in informal interaction.18

Without coordination, collaboration among groups and departments is difficult or impossible. Departments are not generally motivated to collaborate across units. Those who do engage in collaboration do so by their own initiative, making use of fortuitous contacts and friendships rather than long-term partnerships. Because initiatives tend to be entrepreneurial, they receive little or no central coordination.

Educational innovation does not exhibit the same degree of rigor and institutional commitment as MIT puts into its other endeavors. Typically, educational-technology experiments are not well documented. There is a need to review and coordinate the range of developmental initiatives being undertaken and planned by the Center for Advanced Educational Services, Information Systems (especially Academic Computing), Audio Visual Services, and the Dean's Office -- not to mention various initiatives being sponsored by schools, departments, and other units.

Funding is the area where cross-departmental projects and innovations suffer the most. Cross-department educational initiatives are often started on the margin. Successful initiatives, like the Freshman Advisory Seminars, are then expected to become part of the Institute educational program without any funding base for their support. This system of unfunded mandates hobbles cross-departmental initiatives that deserve more general Institute support.

5.4 Findings: The Strategy Dilemma

Just as the regular management and innovation activities are dominated by departmental structures, MIT's strategic-planning activities take place primarily at the level of the departments and schools. If MIT is to prepare adequately for the future, it must coordinate educational strategies at an Institute-wide level. Otherwise the Institute will continue to be held back by the many obstacles that currently stand in the way of strategic planning.

The very different ways MIT manages its undergraduate and graduate student populations helps illustrate the lack of overall strategy on one issue with major implications for every part of the Institute. MIT's undergraduate population has been relatively constant since 1975 because it is centrally managed -- central management was imposed on the undergraduate population in part because of limited housing space and MIT's strong commitment to providing housing to undergraduates. In contrast, the graduate population has grown more or less in proportion to the on-campus research expenditures of the Institute.19 Although the graduate student population has implications for just about every aspect of MIT, from housing to faculty teaching commitments, the size of the graduate population is largely determined by the research activities of the faculty within each department.

Over the years MIT's entrepreneurial culture has resulted in many individual initiatives at the department and school levels that are not necessarily coordinated or monitored for their Institute-wide strategic implications. Innovations in educational technology, which are crucial to MIT's future reputation, have already been discussed. Other cases of entrepreneurial innovation that have not been adequately followed up include the many international collaborations among departments, laboratories, schools, and

the off-campus or "distance learning" educational experiments.

5.5 Market Forces

Each year market forces play a larger role in shaping higher education. There are inherent disparities between market-based values and intellectual values. Competition for certain small categories of students can deprive other worthy students of financial aid, and competition for top faculty can have a similar impact on the overall character of the faculty. Schools and departments competing for high rankings in popular American magazines may divert resources from more important activities to increase their score. Some universities may sacrifice some present educational needs to concentrate on building up their endowments, while others may choose to lessen commitments to need-blind admissions in favor of offering scholarships to attractive candidates. These dilemmas face all of the nation's top universities, including MIT. At times it will be necessary to draw the line between responding to market forces and fulfilling MIT's educational mission.

From the strategic viewpoint, there are many issues that will have a substantial impact on MIT's competitiveness in the future. Decisions now taken at the departmental level have dramatic effects on strategic issues that are crucial to MIT's future success, including MIT's reputation, student admissions, faculty recruitment, research activities, the housing system and design of the physical campus, and the cost of both graduate and undergraduate education.

One strategic problem lies in the way MIT is currently responding to the many pressures to expand both the student and the research base. This expansion is driven by the need to compensate for inflating fixed costs and the desire to undertake new intellectual initiatives. External initiatives like distance learning and strategic relationships are attractive responses to these needs, but some may be inconsistent with MIT's principle of excellence and limited objectives, as has been discussed above. Again, the problem these activities pose for the evolution of MIT's educational processes cannot be addressed without more central coordination.

In general, too many decisions at MIT are designed to maximize the benefits to the local unit, while their costs and benefits to the Institute as a whole are not sufficiently analyzed, evaluated, or monitored. MIT needs to develop an Institute-wide plan for the controlled evolution of educational programs, and to establish mechanisms that allow the Institute to monitor the effects and adjust accordingly. The Task Force is convinced that MIT's basic principles -- academic excellence, a unified faculty, and limited objectives -- cannot be maintained indefinitely without a well-defined, Institute-wide strategic planning process.

In the midst of all these changes, MIT is taking the lead in providing an education balanced between the practice of science and technology and liberal education. If successful, this will make MIT the model of a general education, giving the Institute a new competitive advantage. To achieve this goal, MIT will have to act in a more coordinated way.

5.6 Strategy & Structure Recommendations

1. Maintain MIT's excellence by continuing to focus on education and research that take place on campus.

MIT should continue to be an undergraduate and graduate research-based residential institution focused around those fields that require analytical rigor and quantitative reasoning in which it can excel and that have the potential for positive societal impact. This view is consistent with MIT's historical focus on science and technology, and has been intentionally broadened to include other areas such as economics, linguistics, music, and management. In abiding by this principle, MIT will continue to attract the best students, faculty and staff by offering an exciting mix of excellent educational and research activities that take place within a residential campus community.

2. Focus information technology resources around the library system.

In the future, developments in information technology will center around issues of content rather than facilities or equipment. The library, which has historically been the heart of the university, is the ideal place to ensure that the institution makes the appropriate investment in educational content as well as providing affordable and user-friendly access to information resources. Libraries also need to become more engaged with the teaching activities of the Institute. The library's teaching role should put less emphasis on the acquisition of information per se, and more on the need for students to acquire lifelong skills in locating, filtering, evaluating, and using effectively the wealth of information available to them.

3. Create a strategic planning group composed of the President, Provost, Chancellor, and those they may designate.

The President, the Provost, and the Chancellor should constitute the core of a strategic planning group to provide a continuous process of long-range strategic planning for MIT's educational mission. They should have considerable flexibility in determining the remaining membership and leadership of this group, and should have strong staff support that provides expertise in organizational planning and resource development. This group should interact regularly with the MIT Corporation, especially its Executive Committee.

The following are some of the key issues that need to be addressed by this strategic planning group: the balance between undergraduate and graduate enrollments; the development of new degree programs, such as the Master of Engineering degree programs, that blur the distinction between undergraduate and graduate studies; the balance between research-oriented and practice-oriented graduate degrees; the size of the faculty, and its balance with non-faculty teaching staff; the balance between residentially-based educational programs and distance learning; the analysis of markets for distance learning and other educational products and programs; the balance between MIT's U.S.-focused educational role and its international role; and maintaining the excellence of the student body, faculty, and other staff in a highly competitive environment.

4. The strategic planning group should better define how resources are allocated among departments and cross-department programs.

The President, Provost and Chancellor, with the strategic planning group, should establish well-defined mechanisms for allocating resources to physical facilities, information technologies, staff, and cross-departmental programs. Present processes do not adequately integrate the three types of demands on Institute resources: for teaching, for research, and for community-building. For each type of demand, processes for input, deliberation, and decision-making need to be defined. The strategic planning group should provide departments with incentives for accomplishing Institute goals, and should reallocate resources between departments and the central administration as needed to supply these incentives.

The Task Force recognizes that, while many of the recommendations in this report have advocated allocating resources and providing coordination to various activities, there are real limits to the ability of the Institute to support new programs. In accordance with the principle of excellence and limited objectives, the strategic planning group must determine how resources are to be reallocated, and in many cases this will require diminished support to some programs and activities. While the Task Force has found a need for more central coordination in some areas, the difficult process of reallocating of resources will properly require the input and participation of schools, departments, and individual faculty members.

5. Strengthen faculty governance by streamlining its committee structure to reflect the three areas of the educational triad.

Faculty should institute a comprehensive review of the faculty committee structure. Changes to the structure should be considered which recognize the importance of all three elements of the educational triad: academics, research and community.

The faculty committee structure should be designed so that the faculty and administration can act as a team. Ultimately, limited faculty time is the greatest constraint facing faculty governance. For this reason, the governance structure and agenda should be designed so that faculty members feel it is worthy of their time investment.

THE NEXT STEP

6

6.1 The Need for Change

The Task Force on Student Life and Learning began with a charge from the President to articulate MIT's educational mission and develop a plan of action in accordance with it. Like many institutions of higher learning, the MIT community has a strong democratic ethos, hence we hope and expect that the release of this report will bring about new discussions and conversations on and off campus among students, faculty, staff, alumni, and other friends of the Institute. The responsibility of growing, adapting, and shaping MIT is the responsibility of all members of the community, for we all have a stake in its future.

In many ways, the discussions and conversations that follow this report will be a continuation of those that have come before. The two years during which the Task Force conducted its study have been a time of difficult reflection for MIT, and in some ways the Task Force was lucky to have arisen during this time to gather different strands of thought into what we hope is a coherent vision for the future. After all, underlying the Task Force's charge was a challenge to help the community come to terms with its own future. The Task Force hopes that the recommendations that have emerged in its study will not be thought of as separate points, but rather as an overall model of MIT's role in society, as guided and shaped by its mission and principles.

To live up to its principles, MIT must change and adapt to meet the needs of society. The central finding of this report is that today's society requires MIT to provide an education that merges student life and learning into a unified whole. To accomplish this joining of heretofore separate realms, change will be needed on many levels, from decisions taken by the administration to attitudes held by individual students and faculty. Although this report contains many specific strategic and structural actions, a handful of decisions will not suffice to bring about the change envisioned here.

6.2 A Cultural Shift

A cultural shift is needed at MIT. It is a shift

from demanding separation of student life and learning
to demanding they be inseparable,

from focusing on formal education
to emphasizing learning in both formal and informal settings,

from a community divided by place, field, and status
to a community unified by its commitment to learning,

from keeping research, academics, and community apart
to unifying the educational value each provides.

It would be unreasonable to expect a change in community values to come about overnight, or as the result of a single activity. Tough strategic choices can provide guidance and incentive for change. Given MIT's culture of democracy and scholarly debate, such leadership appears daunting at first, but our history offers abundant precedents for making dramatic changes in educational processes while maintaining a focus on science and technology. Beginning with its founding over a century ago, and continuing with the Lewis Commission after World War II, MIT has built a legacy of meeting the needs of society by adapting where necessary.

The integration of MIT's formal and informal educational processes, and of the three areas of the triad, is not just a necessity we must grudgingly accept, for it also opens bright prospects for the future. MIT is a preeminent educational institution today because at key points in its history it took great strides beyond what had been tried or done. Today's need for change presents the opportunity for another leap forward, and a chance to make MIT the same guiding light for higher education in the 21st century as it has been in the 20th.

Report of the Task Force on Student Life and Learning

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Notes