MIT

Creative Renewal in a Time of Crisis

Report of the Commission on MIT Education · November 1970

Contents

This separation may be a fact of modern life, but it is increasingly an embarrassing fact. It is especially embarrassing at the university because of the expectations that have come to be held of the university, both as a repository of knowledge and a source of moral guidance.

This point is well made in the report of the President's Commission on Campus Unrest. "Why is it," the report asks, "that the university has become the special target of so many of the very students who might be expected to find an institution devoted to the life of the mind particularly worthy of respect?" Part of the answer, as the report observes, is that

> . . . Americans today have higher expectations of the university than they do of practically any other social institution. It is expected to provide models, methods, and meanings for contemporary life. It is an advisor to government and a vehicle for self-improvement and social mobility. Indeed, since science and critical method are enshrined in the university, it occupies a place in the public imagination that may be compared to that of the church in an earlier day.
>
> It is precisely because of these high expectations that the university has forfeited some of its authority and legitimacy in the eyes of many "moderate" students. *

If universities are to live up to these high expectations to any serious extent, it is essential they recognize that the separation which has grown up between knowledge and values has serious consequences. It is equally important that all of us who bear the major responsibility for having allowed this separation to develop do what we can to close the gap. Specifically, we need to ask ourselves, first, what can be done to improve our very definition of knowledge so that it does not automatically exclude questions of purpose, and second, how the university can translate the concern for the integration of knowledge and values into programs of social action without compromising its commitment to the pursuit of knowledge and without jeopardizing academic freedom.

---

* President's Commission on Campus Unrest, Chapter 2, p. 39.

The Intellectual Problem

The impact of progress in science and technology has been felt in many ways. Styles and standards of living have been greatly altered, as have patterns of social organization, cooperation, and conflict. Less often noticed is the way in which this progress has affected the very understanding of what knowledge is and how it is attained. Increasingly, knowledge has come to mean scientific knowledge. Scientific methods of inquiry, as a social critic has observed, have come to be regarded as "the only generally credited systems of explanation and problem-solving."*

In certain respects, we are bound to feel that the increasing confidence in science is an encouraging sign. No one who knows anything about the history of the human race before the rise of modern science would want to see a return to the superstition and intolerance of times justly condemned as dark ages. But there is reason to fear that the very success of science may promote a new species of superstition and intolerance based upon a misunderstanding and misapplication of science.

This should not surprise us if we consider that people who are not scientists and know very little about science regularly wake up to learn of miraculous new scientific discoveries or technological applications, some seeming to promise immortality, others threatening apocalyptic destruction. No wonder some people have come to treat science as an object of worship--trusting to science to cure all the world's ills and blaming it when things get out of control.

This unfortunate tendency to make science an object of idolatry brings in its train a denigration of other avenues of understanding and an effort to impose supposedly scientific methods in areas of inquiry where they are inappropriate and misleading. When public issues are debated, the cry goes out for experts who are supposed to be able to supply the answers. Increasingly such experts are looked to not simply for information or counsel but for decisions -- decisions which, in a democracy, ought to be made by the electorate and its representatives. The style of debate comes to revolve

---

* Paul Goodman, New Reformation: Notes of a Neolithic Conservative (New York: Random House, 1970), p. 6.

around allegedly "hard" considerations of cost and cost-effectiveness and to ignore "soft" considerations, such as the very purposes by which effectiveness is measured. Public figures seek to gain rhetorical advantage and enhance their image by adorning their views with the mantle of science. Scientists are sometimes tempted to pose as experts in areas where they have no scientific competence.

Those who are most committed to the value and the validity of the scientific method should be the ones most concerned about such abuses. Instead of reenforcing tendencies to make science an object of worship, they ought to be the first to point out that it is not some new magic wand. Yet scientists sometimes do not protest loudly enough when claims are made in the name of science that clearly are illegitimate and even harmful. This is especially the case when the scientific method is applied without caution to the analysis of social questions. Scientific method tends to proceed by dissection or reduction; problems are attacked by biting off a succession of digestible chunks. It may be unfortunate, but it is probably true that the more intractable social questions cannot be successfully treated in this way. Deeply set patterns of group conflict seem especially to resist decomposition into bite-sized pieces. While much of value has been achieved by the thoughtful application of quantitative and empirical techniques of social inquiry, it is probably also true that the attempt to make the social sciences thoroughly value-free and scientific has led to a preoccupation with method at the expense of substance and to a disregard of vital social issues.*

The dangers inherent in the worship and misuse of science can be obscured by an over-preoccupation with the "two cultures" contro-

---

*Overdrawn as it may be, there is probably some truth in the pungent comment of a leading critic of modern political science, Leo Strauss: "...one may say of it that it fiddles while Rome burns. It is excused by two facts: it does not know that it fiddles, and it does not know that Rome burns." Liberalism: Ancient and Modern (New York: Basic Books, Inc., 1968), p. 223. A similar, though more balanced critique, is made by Sheldon Wolin in "Political Theory as a Vocation," American Political Science Review (December 1969).

> and the quality of life; the moral and ethical dilemmas involved in the development and use of biological and other human manipulative devices for warfare among and within nations . . ." *

Questions of this complexity cannot be addressed successfully by narrowly trained specialists, even when they work together in teams. Yet, ironically, it is the very success of specialized knowledge which forces attention to such complexities and which engenders hope that groups of specialists working together can somehow unravel the difficulties their separate labors have helped create.

Clearly, if the university is to improve the human capacity for coping with such complexities, it must try to find ways of broadening professional education. For a long time there has been discussion at MIT of the importance of developing among scientists and engineers an awareness of and a sense of responsibility for the consequences of their work. The Lewis Committee spoke quite directly to this problem. Until recently, however, the job of promoting awareness of moral and social responsibility has largely been left to the humanists -- as if anyone but professionals training other professionals could instill a proper understanding of the problem. Even the educational goals of efforts to broaden or "humanize" the education of technical professionals have fallen short of the mark, because the desired result has been to develop empathy or good intentions. Those are worthy goals, but the roles and responsibilities of today's scientists require that something more than technical ability and good intentions be included in their professional qualifications. There may be a need for more meaningful codes which call upon technical professionals to take morally responsible actions in relation to the consequences of their work. There is certainly a need to review the education and intellectual abilities which a professional ought to have if he is to carry out such actions in a successful manner. The fact is that despite the growing recognition that the knowledge and ability required to deal effectively with questions of value are important attributes of technical leaders, these attributes have generally not been included in the list of competences which define a good "scientist."

---

* Alfred Kazin, "Whatever Happened to Criticism?", Commentary, Vol. 49 (February 1970), 2:61-62.

who can be articulate and persuasive in public debate. The seminars that have recently been set up dealing with the social implications of progress in science and technology are a valuable step in the right direction.

The Sciences and Humanities: Two Cultures or One?

As we noted at the outset of this report, MIT is deeply committed to the belief that there are not two cultures or a multitude of cultures, each enclosing a vocational or disciplinary universe--but only one; and that science, which in this sense includes technology, is a vital element of that culture. It is wrong and unproductive to assume that science is in some sense inherently at odds with humanism or to hold, in what amounts to a corollary of this assumption, that one is superior to the other and must therefore dominate in any curriculum.

We at the Institute have a unique opportunity to contribute to the effort to forge new links between knowledge and values. Our strength and diversity in the major fields of science and engineering have been complemented by strong faculties in the social sciences and humanities. Our students come to us with an impressive breadth of intellectual abilities and interests and with an idealism that does them great credit. Our traditional links to government and industry could become levers of beneficial influence.

Such an effort will make headway only if we learn to understand more fully and teach more effectively how to integrate different kinds of knowledge for the sake of responsible social action. The development of new and broader interdisciplinary programs at the undergraduate and graduate level should help in this effort, but the success of these programs will depend upon our removal of a serious obstacle. The largest single barrier to the development of an effective style of synthesis is the separation that has grown up between the sciences and the humanities.

This separation is everybody's fault. At least in part it is the fault of the humanists, as a leading classicist has acknowledged

with admirable candor.* Instead of devoting themselves to the task that is uniquely theirs, too many humanists have sought merely to transpose the methods and aims of science onto their fields of study. Instead of concerning themselves with the articulation of values as life-giving forms, they examine, classify, and dissect them as lifeless facts, shunning encounters with moral intelligence, as William Arrowsmith has said, in favor of limited academic inquiry:

> If humanists do not have the courage to speak out for the imagination and the humanistic intelligence (which means, among other things, making intelligent statements about value), then they are not humanists at all, but merely technicians of dead and living languages.*

If there is, therefore, a single, pressing need within the university, it is that this preoccupation with matters of fact, in both the sciences and the humanities, be replaced by a recognition of the relatedness of knowledge and values. The need is for faculty and students in all disciplines to think of themselves once again not as specialists but as members of an intellectual community engaged in a continuing effort to define the goals that ought to be pursued in a scientific and technological age.

As the sciences advance, they increase our capabilities; but they cannot supply the criteria to direct the use of these new capabilities. Such criteria only arise out of a continuing examination of human needs and opportunities. While the humanities cannot supply these criteria either, humanistic studies perform an indispensable service by helping us to shape and articulate our values. When this vital role is performed well, the sciences and humanities can collaborate for the benefit of mankind. If these two forces do not cooperate, the life of the mind threatens to become academic in all the worst senses of the word--trivial, irrelevant to practical needs, sterile but potentially dangerous.

---

*William Arrowsmith, "The Shame of the Graduate Schools: A Plea for a New American Scholar," Harper's, Vol. 232, No. 1390 (March 1966).

** Ibid., p. 52.

Education at MIT, as at other universities, will not begin to succeed in helping, in Seaborg's words, "to raise men to a new level of rationality and humanity" unless the cooperation of the sciences and the humanities is actively encouraged.

Improving MIT as an Environment for Humane Learning

In practical terms we must face the question of why, after considerable effort to overcome their separation, we find the humanities and the sciences still not well-integrated in the intellectual life and the educational programs of the Institute. MIT has always recognized that it could not responsibly offer only a technical training to its students but also had to provide them with a broader education. In recent decades it has strengthened the humanities and social sciences curricula and has sought in other ways to enrich its cultural life. Yet we cannot say that these efforts to make humanistic learning and concern with questions of value as important as they should be in the life of the Institute have thus far been as extensive or as successful as we would like. What is the root of the problem?

The difficulty, in our judgment, is that the general environment at MIT is too narrow: it does not adequately encourage or sustain humane learning in the fullest sense of the term.

To some extent, this is a consequence of the intellectual problems we have noted. But more is involved than the kind of intellectual fragmentation and narrowing that we have described. The Institute is in fact so dominated by the ethos of science and technology that other modes of thinking and other approaches to the analysis of human and social problems do not, for the most part, receive the serious consideration they should. Despite MIT's recognition of the importance of the humanistic and social disciplines and despite its real efforts to enhance the stature of the humanities and social sciences and the arts at the Institute, these all still play a marginal role here; too many students and too many faculty members continue to think they are unimportant, irrelevant, methodologically "soft", and hence not productive of new knowledge, appropriate perhaps for those romantic periods of self- and social concern that all students seem to have to go through, but not really germane to the central concerns of the Institute.

However much MIT may counsel its students about the importance of the humanities and social sciences and tell them that an education is incomplete without some experience in those areas of learning, the very structure of the curriculum and the clear requirements for success at MIT encourage them to relegate such studies to a minor secondary role in their intellectual lives. They are led to recognize that certain fields, disciplines, and subjects and certain modes of analysis count and that others do not; that it is their technical proficiency above all that the Institute really cares about. Immense value is put on technical problem-solving ability, on the acquisition of instrumental skills; less is demanded in other areas, and the message gets through. We note, for example, that first- and second-year subjects in the humanities and social sciences carry fewer credit "units" than science subjects do--an almost trivial example but one that points, we think, to deep-seated assumptions and values at MIT that manifest themselves in a variety of ways tending to narrow our intellectual environment.

The dominant technical, quantitative style of the Institute operates to stifle concern with other modes of knowing and expression and tends to divert attention from aesthetic and other non-quantifiable values, as is evident by a glance at our extremely functional and unlovely physical environment, which in many ways is brutally austere and ungraceful. Inadequate attention is paid to the affective aspects of learning, and the arts still play a very small role in our total experience at the Institute. Visual education, despite some remarkable efforts in this direction, has been neglected; that there is a craving for more beauty and color in our community is suggested quickly enough by a walk through the main hall of the Institute, whatever one may think of the wall-art that has thus far appeared. The Kresge Auditorium, the MIT Chapel, and the Student Center have done a great deal to humanize the student environment, but much more remains to be done along the same lines.

In the most general sense, despite all the changes of the past decades, there remains at MIT a decided bias against humanistic learning. How this can be modified is a difficult question, but it is one that the Institute cannot avoid. The problem involves more than the relegation of the humanities and social sciences to a minor (and in some measure avoidable) part of the curriculum; it is a result also of the overwhelmingly skill-oriented, problem-solving approach of the scientific and engineering education offered at the Institute. No one would for a moment deny the great importance

But one must breathe. One wonders how much a student taking five or six subjects really is learning.

In many ways MIT is a fragmented community. This is yet another aspect of the environment we must consider. The dominant ethic at the Institute is one that urges individual striving and individual excellence--this despite the tradition of collaboration and sharing that is so strong in science and engineering. To be sure, much collaboration does go on at MIT--for example, many projects are genuinely collective efforts. In both oblique and sometimes systematic ways we do learn from one another and assist one another. Yet the Commission feels that there may be too much stress on individualism and not enough on a community of effort and purpose at the Institute. This is, unfortunately, especially true of students at MIT, who, even though there is a visible reaction against competitiveness among them, still strive so hard to excel as individuals that they do not adequately learn what genuine cooperation is. The result is the perpetuation of a kind of isolation and alienation among them that makes the experience of other perspectives and values difficult. The strong individualism that is a result of achievement-orientation works to diminish a sense of community and reduces the opportunities for a kind of casual, humane learning--about how others think and feel--that no curriculum can produce. The more we are isolated from one another, the less adequately we know what it means to be fully human. This is true not only of the students at MIT. The faculty members are submerged in their work, separated by their functions, isolated by rituals and status arrangements, kept apart by professional preoccupations, imprisoned in specialized languages, scattered throughout an enormous academic city. They are turned in on themselves in a variety of private enterprises. Even physical conditions and arrangements are not conducive to a strong sense of community: many students and most of the faculty of necessity live at some distance from the Institute; and the various departments and disciplines at the Institute are not only intellectually but physically separated. These are problems for which there are no clear answers and for which in some instances there are no answers at all. But the real fact of our fragmentation is something we ought constantly to bear in mind and try to overcome in whatever ways seem feasible.

One possiblity that some members of the Commission feel is worth exploring would be to experiment with small learning "communities" of fifty to one hundred students, each with its

own faculty and even with its own physical center. Though the effort would be immense and the departure from current operating procedures difficult to arrange, the gain in our view might be significant: communities of shared purpose provide opportunities for liberal and humane learning that are important for the broad education of the students and for the strengthened engagement of the faculty in the life of the Institute.

In our judgment, it would also be a good idea to organize a month-long, Institute-wide conference on the subject of "Knowledge and Human Values" to take place as soon as it can reasonably be arranged. During the conference period, scholars and social critics with different views and perspectives should be invited to participate in formal and informal meetings with MIT faculty and students. Topics might include the values or consciousness of the "youth culture", the nature of scientific reasoning, and the conflict between technocratic and democratic decision making. The conference should also consider ways of making discussions of this kind a regular feature of MIT education. If well designed, such discussions could add a significant new dimension to the intellectual life of the Institute and offer a badly needed opportunity for communication on problems of general concern.

We realize that the phenomena we have been discussing are simply heightened local manifestations of general cultural tendencies and values in our society, which is fact-minded, pragmatic, individualistic; preoccupied with technical progress and power; restlessly active; and still dominated by the work ethic. Nationally, we have only recently achieved awareness of the need to reexamine our purposes and to pay much greater attention to the quality of our lives. In a sense, we are suggesting that the Institute make an effort to transcend the surrounding culture; if this cannot be accomplished in our universities, then where will it be done?

Science and Technology in the Service of Man

In a certain very real sense, what we need to do to improve the environment at MIT is similar to what needs doing in the larger society. Great achievements have been recorded in science and technology, but as we consider the current state of the world, we cannot fail to be struck by the disparity between the level of our

accomplishments in science and technology and that of our attainments in improving the quality of human life.

Who is to blame for this disparity? Some claim it is human nature which leads us to seek power through knowledge only to become the victims of our own reckless pride and ambition. Others say it is our acceptance of a "technological imperative" that holds in effect, "whatever can be done must be done." Others blame our social systems and ideologies. If there is no shortage of culprits, however, there is a shortage of constructive suggestions as to how the situation can be improved.

We at MIT have always believed that science and technology can have enormous benefits for civilization. It is true that many of the social problems we face today are by-products of advances in science and technology, but we must bear in mind that in a great many cases these problems have arisen only because the human race has managed to solve earlier challenges to its survival and evolution. If we can worry now about overpopulation, it is because we have conquered many diseases and are able to prevent many of the premature deaths that previously checked population growth. If we need better systems of transportation, it is because the barriers of distance have been dramatically reduced and new expectations have arisen with respect to mobility and ease of communication. If we can be concerned now with providing everyone with decent housing, equal educational opportunity, and a chance to build a career rather than simply perform a job, it is because we have so vastly improved the productivity of labor by advances in technology that there is no longer any need to accept the proposition that most people must be condemned to a life of drudgery and social inferiority.

It is too easy to lose sight of the great progress that has been made, thanks to the advance of science and technology, and to blame scientific reason for failings due far more to misdirected human and social passions. But it would be a grave mistake for anyone to think that the problems we now face can best be treated by curbing progress in science or by somehow turning off the technological tap. Professor Victor Weisskopf, who shared with the Commission his concern for the future of science, quoted the words of warning of the philosopher of science Michael Polanyi:

> Encircled today by the crude utilitarianism of the philistine and the ideological utilitarianisms of the modern revolutionary movement, the love of pure science may falter and die. And if this sentiment were lost, the cultivation of science would lose the only driving force which can guide it towards the achievement of true scientific value. *

With Professor Weisskopf, all of us at MIT believe deeply in the value of science for its own sake--as an expression of the age-old human desire to know, and through knowing, to be free of fear, ignorance, bias, and superstition.

We also value science because we know that it is indispensable to progress in technology. We value technology because we believe that useful knowledge is indispensable to social progress. If we are to save the natural environment at the same time that we extend our productive capacity to assist those who still endure poverty, we will need to develop sophisticated systems of industrial management. We will need to create early warning systems to detect dangers before they become too difficult to manage. If we are to cope with decay in the cities, we will need better and cheaper forms of public transportation, newer techniques in construction and housing, better systems for the delivery of health care. Achieving these improvements will require the best talents and best resources universities can offer.

Perhaps the hardest set of problems society faces are those of the environment. We have several times called attention to the unfortunate consequences of the separation and distillation of knowledge into separate disciplines. Nowhere are these consequences more evident than in the crisis of the environment. The failure to examine our collective behavior in the context of a single, finite, interactive system has led us to the brink of catastrophe. Solving the problems of the environment will require more than simply substituting non-polluting for polluting automobile engines. We must also consider the habits of mind and the cultural values that have led us to worship consumer goods and desecrate the environment which gives us life and connects us to the rest of the natural universe.

---

* In Personal Knowledge (Chicago: University of Chicago Press, 1958).

Technology alone will not solve our social problems, but it is a critical instrument of any constructive solution to many of them. In the past, societies generally devoted technology to the improvement of production and to raising the standard of material comfort. There is still much to be accomplished in these areas. Now, however, the critical resources of technology, human and material, must be turned toward a set of new social concerns. In the "post-industrial" stage of history, our continuing preoccupation with overcoming material scarcity and curbing the dangers of the natural environment must be balanced by a heightened concern for the quality and purpose of individual and social life. That is one reason why it is so important that MIT education be redesigned to make possible a broader and more responsible kind of professionalism. It is also why we must begin to devote more of our resources to the identification of major social priorities and to attempts to assist governments and groups of concerned citizens to act on these priorities.

Public service has always been a major concern of MIT. Today, the concern for public service must take the form of a new effort to cope with pressing problems that have been badly neglected until now. In the decades ahead, the pressures of unchecked population growth, the depletion of mineral resources, the alarming deterioration of the environment, and many other problems will call for the highest possible degree of technical and scientific sophistication. Technologists will be called upon to find temporary as well as long-range solutions to such problems, in order to allow society the time it may need to develop more fundamental approaches.

We do not propose, therefore, that MIT in any way abandon its fundamental commitment to the application of science and technology to the work of society. MIT must continue to be a place where the rational formulation and solution of problems is the leading concern, where the phrase "scientific method" describes a serious effort of scholars to understand man and nature, and not the misuse and misapplication of scientific methods, which may properly be criticized. No complex society today can survive, let alone solve its pressing problems, without the help that engineering and the engineer's understanding of what "process" is about can provide. The changes in educational format which we introduce at MIT must be designed to preserve that critical aspect of MIT's fundamental structure that is aimed at building from the sciences--natural and social--to the technologies whose ultimate purpose is the service of man and society. We must make a similar effort with respect to public service.

focus; depending upon the style of the next president, it may also be advisable for the Provost rather than the President to chair the Academic Council. Both these changes would help to permit the President to concentrate his energies on educational priorities.

Politics and Academic Freedom. The involvement with defense research has lately been a subject of much controversy. Decisions to engage or terminate institutional technological projects frequently involve value judgments, even when the objective is not military. The definition of what is a political issue must be revised, both to protect academic freedom and to ensure that universities do not try to isolate themselves from the human consequences or the moral significance of their actions. This question can only be resolved--if then--in particular cases. The Institute community has a legitimate concern with and a right to a voice in matters involving relations between the Institute and external institutions. When questionable cases arise, those responsible for approving commitments of our institutional resources should discuss the issue with some group representative of the community before making a final decision. It may help if the Corporation invites the faculty to develop its views on the meaning and relevance of academic freedom to such decisions.

Academic institutions are exceedingly vulnerable to attacks of many kinds. There is no cure for this vulnerability, but we can at least recognize that to preserve the open atmosphere of the university we must try to protect both the right to dissent and the right of the university to function. We need to formulate a clear and simple statement of basic rights and responsibilities and to provide an effective judicial system for treating violations. We have a right to expect that if channels are provided for dissenting views to be aired, they will be used. We must look to the Corporation, as well as to our alumni and friends, to help protect the Institute from external attack.

4. Knowledge and Values

> There is now underway a profound national effort aimed at transforming and renewing our national sense of purpose. This is an effort in which MIT can and should take a leading role: first, by taking seriously the intellectual problem of defining the relation of knowledge to values; second, by improving our own performance as an environment for humane learning; and third, by stressing MIT's traditional commitment to public service and encouraging faculty and students to play an active role in the determination of public policy in areas of great social concern. *

*Chapter I of this report.