in a university setting, a total budget several times greater. This comparison is obviously not meant to suggest that Plato could be substituted for such an institution. Rather, it is intended to indicate that a single Plato IV system could augment by 20 percent the instructional capacity of five such institutions on an annual budget of less than $1 million each.

Alternatively, this added capacity could release an equivalent portion of faculty time for developing new programs, for teaching in smaller group settings, or for providing extra help to individual students. The possibility of such enrichment of our national educational capability has provided added incentive for implementing and testing the Plato IV design and for learning how such a system would function in various educational settings.

The introduction of a major new technology into the educational process will undoubtedly raise questions on the part of some educators concerning the possible negative impact of an inanimate tutor on the very human processes of learning and teaching. Similar questions may well have been raised when the printing press and inexpensive paper were introduced into the educational process in the 15th century. It was not long, however, before the technology of the printed page became so identified with education that the library became the universal symbol of educational excellence. We believe that the resulting explosion of knowledge and of information has made the introduction of computer-based education all the more needed in a rapidly changing world.

The Plato program has called for a unique combination of educational and engineering talents. The program has benefited from cooperation among experts in many disciplines and among educators in universities, community colleges, high schools, and elementary schools. Finally, it has depended in a critical way on cooperation among educational institutions, industrial corporations, and government agencies. These features may be indicative of a new level of interinstitutional relationships which would accompany the incorporation of computer-based systems in the educational process.

References and Notes

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Purpose and Function of the University

University scholars have a major responsibility for survival and quality of life in the future.

V. R. Potter, D. A. Baerreis, R. A. Bryson, J. W. Curvin, G. Johansen, J. McLeod, J. Rankin, and K. R. Symon

Early in 1967 the Interdisciplinary Studies Committee on the Future of Man, together with other groups on the University of Wisconsin Madison campus, was asked to comment on four questions raised by the Board of Regents about the purpose and goals of higher education: (i) What are the purposes of higher education? (ii) What should be the goals for the University as an entity? (iii) What should be the goals for each segment of the University? (iv) To what extent should students and student organizations be involved in University government?

The University's response to these questions included a recommendation for a more thorough study of some issues. Because our committee was not fully satisfied with either its own recommendations (*1*), or the University's response we expanded and extended our earlier comments.

The Interdisciplinary Studies Committee on the Future of Man has been in existence since 1962 and has considered many aspects of university purpose and function in connection with our concern about the future of man. Together with many other faculty members and students we share the malaise that affects other members of society who are concerned about the future. We affirm the views that the survival of civilized man is not something to be taken for granted, that governments throughout the world are experiencing great difficulty in planning for the future while trying to cope with the present, and finally, that the university is

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one of the institutions that has a major responsibility for the survival and improvement of life for civilized man. We agreed with the most recent faculty report that an important *purpose* of the university is "to provide society with objective information and with imaginative approaches to the solutions of problems which can serve as the basis for sound decision-making in all areas" (*2*). But in referring to "solutions of problems which can serve as the basis for sound decision-making in all areas" we feel that there is great danger that universities as institutions will be so inundated with problems of the immediate present that they could become merely "public utilities" (*3*). It is important that an increasing number of university scholars should consider the impact of present actions in terms of future viability of our society. It does not appear that any of the past reports on the purpose and function of the university have even remotely suggested that the future of man is at stake, or have suggested that the university must bend its efforts to any significant degree to accommodate to that issue.

We can no longer afford the luxury of assuming that the future will take care of itself. The question is whether previous statements of University purpose provide goals which, if faithfully pursued, would contribute adequately to man's survival and improvement, or whether these statements of purpose need to be made more explicit. We believe that the statements do indeed need to be made much more explicit, and we propose to revise the statements of University purpose in terms that are compatible with the University's heritage, and at the same time cognizant of the University's responsibility to future generations of man.

We believe that the 1968 statement of university purpose (*4*) was caught up in an ambivalence in attempting on the one hand to maintain "the search for truth" in its purest form, while at the same time making the claim that universities are the "prolific and unfailing sources of ideas, concepts, and philosophies that have guided the progress of humanity and the advancement of Western Civilization *in all its material, spiritual, political, economic and social aspects*" (italics added). The 1968 report took the position that the benefits can be achieved only if the search for truth is accepted as the "ultimate purpose of an institution of higher learning" because "the modern institution of higher education is the only one in our society in which this search, untrammelled by the need for specific solutions, can possibly take place." We believe that, in fact, the universities have undertaken a multitude of directed searches for specific solutions (*2*), but we suggest that at this time a distinction between society's immediate problems and society's future is required.

Statement of Purpose

In answer to the Regents' question: "What are the purposes of higher education?" this committee responded that:

The primary purpose of the University
Is to provide an environment
In which faculty and students
Can discover, examine critically,
Preserve, and transmit
The knowledge, wisdom, and values
That will help ensure the survival
Of the present and future generations
With improvement in the quality of life.

We seek a wide acceptance of this restatement of purpose. In so doing, we acknowledge the legitimacy of other purposes of the University and do not wish to interfere with them (*2*). Rather than alter these other purposes or interfere with academic freedom in any way, we seek positive incentives and procedures by which future-oriented programs would be encouraged. Ways should be found to allow students and faculty to engage in the interdisciplinary efforts that are implied by the statement of purpose. Such an orientation might help to close the "relevance gap" that now exists between faculty and students.

We wish to make clear that the restatement of purpose implies continual stimulation toward new problems and methods of attack rather than an a priori specification of a finite set of present problems and methods. Our belief is that the problems of survival and improvement can best be met with an open-ended and pluralistic approach in which the judgment of priorities is under constant surveillance and reexamination.

We believe that only by a radical departure from the abstract statement "to search for truth" will it be possible to educate students, faculty, and government as to what the university really represents. It should be recognized that the university and all government agencies are under tremendous pressure to solve current problems, and no one denies that these problems are urgent. But we must here emphasize that government and industry can and will be primarily responsible for solutions to problems of the present, though they will in many instances draw upon university resources. On the other hand, the university by its very nature must be future-oriented because it is responsible for the joint effort by which faculty and students provide knowledge, skills, and social values for much of the leadership for the next generation.

We believe that the new statement of purpose does not jeopardize academic freedom, and we suggest that any member of the faculty might welcome an opportunity to explain how his scholarship relates to this overall purpose, and might equally welcome administrative changes that would permit him to be more effective. We believe that a future-oriented university would find ways for students and faculty to engage in interdisciplinary efforts that would contribute not only to the future but to the present.

Search for Truth

The statement that the purpose of the university is to "search for truth," when coupled with the academic tradition that "freedom of inquiry" is the key to progress in Western Civilization (*4*), has several consequences that need closer examination. Taken together they provide no recognition that there are many kinds of truth, that there may be an obligation to place priorities on some goals, or that the search for truth has taken different forms in each succeeding generation. It seems to be assumed that individual professors, students, or departments can search for truth along different paths and at different rates, and that the products of their efforts will emerge in the form of knowledge that will at once contribute to the quality of individual lives and of society. To this viewpoint we would assert that in the main the key decisions are made upon the basis of value judgments that are present-oriented and not future-oriented.

The effectiveness of the present system depends upon the validity of one or more of the following assumptions: (i) that a kind of societal wisdom will constitute a free market of ideas and skills in which the laws of supply and demand will regulate the "search for truth" so as to produce the truths most needed; or (ii) that the leaders in the "search for truth" have the wisdom to place their efforts where they are

most needed and to integrate new facts into a comprehensible pattern of new wisdom; or (iii) that the academic "search for truth" is mainly a didactic exercise and that the by-products are either harmless or readily stockpiled until they can be properly harnessed. These assumptions all fail to consider the fact that the university in point of fact does not operate in a totally laissez-faire environment. It is strongly influenced by public needs that are present-oriented and only weakly influenced by pressures that are future-oriented, and the present-oriented functions have been most frequently directed to the preservation of the status quo even if the future may have been put in jeopardy.

Moreover, the idea that the purpose of higher education is the "search for truth" coupled with "freedom of inquiry" has become institutionalized. At the same time the totality of available knowledge has become too great for any individual professor or student to master. The result has been greater and greater specialization and a concentration on certain problems without regard to the needs of society and without recognizing or caring that societal wisdom has become unable to maintain a free market for ideas and skills in which the truths most urgently needed will be the truths uncovered. The result has been "uncertainty concerning the role of the university" (*5*). In the face of a malaise in all segments of a society in which there is a growing conviction that there is no one at the controls, and that neither deities nor governments really have a plan for the future, the academic world clings to the twin slogans of "search for truth" and "academic freedom." Faculties fail to recognize a pervasive conflict of interest in which professors naturally prefer to be as unregulated as possible (*6*), and in which each specialist feels that his own microcosm deserves increased financial support in the interests of society without asking how or where we find the minds that can put the pieces of knowledge together in the service of a societal wisdom.

Thus, for many of our faculty the motivation for stating that the purpose of the university is "the search for truth" comes partly from a natural desire to be as unregulated as possible and partly from an honest conviction that only by such an abstract statement and the resulting evolution of ideas and techniques can the maximum benefit to society be achieved. It is honestly believed by many that the search for truth cannot be directed and that any attempt at direction can only result in some degree of crippling of the overall effort. We would insist that acknowledgment of at least some responsibility for the future would not exclude an open-ended search for truth according to the critical standards, personal integrities, and loyalties that have always been assumed in academic life. Indeed it might be suggested that such an acknowledgment would give academic effort a new impetus.

We affirm that the university faculty members have an obligation to identify the orientation of their search for truth in terms that are explicit and meaningful to today's youth, to the older generation, and to one another. It is possible to be explicit about the orientation with respect to the future while at the same time being open-minded as to the means or the possibility of different individual orientations. Moreover, it is perfectly rational to defend a sizable proportion of nonoriented or totally laissez-faire search for truth provided there is some obligation to consider the consequences of the technological applications of new knowledge. In the present era, as never before, technology moves in on basic discoveries so rapidly that the side effects and future consequences are frequently not adequately considered. Because many consequences cannot be anticipated, it is necessary to build into our science-technology apparatus the sensors that could constitute early warning signals concerning threats to survival and to various societal values.

Future-Oriented Search for Truth

We believe that the university has an obligation to examine and preserve the value judgments that can elevate the condition of the society on which it depends. It can serve this function by a search for truth that is future-oriented and that explicitly recognizes the need to transmit not only knowledge but also meaningful value judgments to succeeding generations. Recognition of this purpose does not assume the detailed administrative regulation of all scholastic effort because in a future-oriented university the first thing that must be agreed upon by the faculty would be that neither we nor society at large knows how society should proceed, in terms other than the broadest concepts of change within a constitutional framework.

As faculty members we should realize that we must adopt a position of humility when we face the future, a humility that is not merely a mask for incompetence, but a humility that is willing to lay its measure of competence on the line, willing to step over the disciplinary boundary, willing to criticize and to be criticized, and willing to allow cherished personal insight to evolve into an effective working hypothesis or an action policy for a group. We should recognize the need for interdisciplinary groups in which competence is not defined solely in terms of disciplines that have been in existence for 50 or 100 years. We should recognize scholarship that is individual and that is built from components of several older disciplines. We could find satisfactory ways to recognize such scholarship for the future just as we have found ways to recognize scholarship in the past.

Conclusion

When it is admitted that no individual knows the most appropriate criteria for judging actions that are future-oriented, it must be recognized that pluralistic approaches and solutions need to be developed and maintained on the basis of all the knowledge that can be brought to bear on the issues, following all of the principles stressed in the 1969 faculty report (*2*). These are so fundamental that they need to be restated here: (i) there must be complete intellectual freedom for faculty and students; (ii) satisfactory solutions to problems can be achieved through rational inquiry and discussion; (iii) implementation of needed changes in the university must be through legal means; (iv) each individual has the right to his opinion and to be heard, but no individual has the right to prevent those of differing views from equal opportunity to be heard.

Once these principles are unreservedly accepted by Regents, faculty, and students, together with an acceptance of the primary purpose as future-oriented in terms of survival and improvement, we believe that this university could proceed to the detailed discussion of the operational problems: how to improve the teaching function, how to achieve a proper balance between teaching and research, how to facilitate the

organization of vital interdisciplinary programs, how to evaluate the values of the past in relation to the future, and how to achieve a sense of community among students, faculty and citizenry (*7*).

References and Notes

1. The 1949 report of the Committee on Functions and Policies identified two types of education, professional (livelihood), and liberal (cultural and moral), and expressed confidence that the University was doing very well in meeting its obligations for professional education. The report was critical of the University's efforts in liberal education, however, and noted that "we must recognize a large measure of failure" in developing in students the "highest cultural and intellectual interests." But that report offered no clear definition of need nor provided the sense of urgency that might have produced significant efforts toward improvement. The report by the Interdisciplinary Committee in 1967, as drafted and revised by Professor Robert Siegfried of the Department of History of Science, commented that the University's position in providing adequate liberal education was even weaker than in 1949 when viewed against the terrifying greater need. The 1967 report is available upon request.
2. A statement on University purposes and principles was adopted by the University of Wisconsin Faculty Assembly, 26 February 1969. This statement included the following: "The purposes of a University are: (1) to provide students with optimum opportunity for learning from the heritage of the past, for gaining experience in use of their intellectual and creative capacities, and for developing themselves as concerned, responsible, humane citizens; (2) to extend the frontiers of knowledge through research; (3) to provide society with objective information and with imaginative approaches to the solutions of problems which can serve as a basis for sound decision-making in all areas."
3. J. Barzun, *The American University—How It Runs, Where It Is Going* (Harper & Row, New York, 1968).
4. Report to the Board of Regents by the University Faculty Council, Document No. 5, presented to the University Faculty Assembly, 3 February 1968.
5. *Crisis at Columbia*, Cox Commission Report (Random House, New York, 1968), pp. 19–24.
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7. On 1 December 1969 the faculty unanimously approved this document (Faculty Document No. 279) as "an appropriate and timely supplement to previous statements of University purpose and function" and specifically endorsed the statement of primary purpose.

NEWS AND COMMENT

Helium: Costs Jeopardize Future of Government Conservation Program

The fate of a government program to stockpile helium—a unique natural resource that is rapidly being wasted—is under review at high levels in the Nixon administration. The review was sparked largely by financial pressures. The government's helium conservation program, which provides for extracting helium from streams of natural gas and storing it underground for future use, has recently been running at a huge deficit. Everyone close to the situation agrees that something must be done to rectify the mess. But knowledgeable scientists are worried that the Nixon administration, in responding to short-range financial pressures, may allow the squandering of a priceless natural resource that may be desperately needed by future generations.

The outlines of the struggle are still somewhat indistinct, for much of the debate is going on behind closed doors. But, in general, the continuance of some kind of helium conservation effort seems to be favored by the scientific community and by the tiny helium industry, which profits from the existing program, while the need for further conservation has been questioned by economists and budget-oriented officials. One of the leading opponents of the conservation program is said to have been John F. O'Leary, who headed the Bureau of Mines until recently. (Helium activities accounted for almost half of the Bureau's entire 1969 budget of $117 million.) The leading scientific body that considered helium needs—a National Academy of Sciences committee—felt strongly that the conservation effort should be expanded, but its recommendations were toned down before publication because of protests by the Bureau of Mines.

The alarm over helium stems from the fact that it has unique properties for which there is often no real substitute in high-technology applications. Helium is the only gas which can be used to develop the low temperatures needed to attain superconductivity in metals, since it is the only known material that remains fluid at temperatures near absolute zero. It is also the lightest inert gas, is less soluble in fluids than any other gas, has the lowest liquefaction temperature of any gas, is the only known substance which will not freeze at atmospheric pressure, and has the lowest refractive index of any gas. Helium is nonflammable and nontoxic to man, has a small molecular cross section, and does not become radioactive.

These properties, singly and in combination, give helium many important uses, some of which are unique. The largest current use for helium is as a purging and pressurizing agent in liquid-fueled rockets. Expanding helium provides the pressure needed to push the rocket fuel to the engines, and helium keeps the propellant mixtures at the proper temperature.

Helium's lightness and nonflammability make it the safest lifting gas; its small molecular size and rarity in the atmosphere make it superb for leak detection; its nontoxicity and lightness make it valuable as a breathing mixture for underwater work; and its ability to reach low temperatures and gain superconductivity make it necessary for most kinds of super-cold applications. Helium is currently used extensively in shielded-arc welding and gas chromatography. It is also expected to play a key role in the development of nuclear reactors, lasers and masers, magnetohydrodynamics, and superconducting cables for transmitting electrical power.

The chief existing source of helium is certain natural gas reserves, of which the largest known happen to be located in the United States, primarily in Kansas, Oklahoma, and Texas. The helium in these reserves is generally thought to have been produced by long-term radioactive decay processes in which uranium and thorium emitted alpha particles (helium nuclei) which then captured electrons and became stable helium gas. The threat to this supply of helium lies in the fact that the natural gas supplies are used as a domestic household fuel. Unless the helium is extracted before the gas is delivered to the customer, it is passed into the atmosphere when the natural gas is burned.

In an effort to save this disappearing resource, the federal government launched a helium conservation program in 1960. The government has long been the leading user of helium, and the Bureau of Mines in the Depart-