

general education of the undergraduate planning to enter medical school or in the training of medical students and post-graduate residents, the university setting offers opportunity. There are also many practical problems, including already crowded curricula, which prevent the realization of those opportunities. But in an atmosphere of mutual respect and a concern for persons that is shared by teachers and students I believe there is no setting which can promise richer results.

John Boyle

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AN ADDENDUM

As a point of departure in considering the future of higher education, one can state, with a high degree of assurance, that there will continue to be a large educational establishment, not just in the United States but

in all countries that hope to survive. This statement is not as trivial as it may at first seem, for this is an age in which not just the success, but even the survival, of some enterprises which formerly were cornerstones of the United States establishment are in doubt. Our steel and auto industries, for example, certainly would welcome similar assurances of continued existence. Higher education in the United States will indeed flourish, for at least two reasons. First, human history will continue to be, as H.G. Wells observed in his 1920 *Outline of History*, a race between education and catastrophe. In recent years, I have come to fear that the race is becoming a dead heat. Therefore, it seems clear that society has no reasonable alternative to a continuing major commitment to higher education. Second, American universities will continue to thrive because they are enjoyable places, not only for the students and staff, but also for many others who have no formal connections with the schools, nor interest in them beyond their attainments in intercollegiate athletics. Universities have become major components of the entertainment, sports, and cultural establishments in the United States, maintaining, as they do, professional quality athletic teams, superb recreations centers, excellent cultural programs, and outstanding museums, all generally set in surroundings that would grace a country club. Universities now offer not only unparalleled opportunities for those who seek knowledge and skills, but also highly respectable, heavily subsidized, and extremely pleasant havens for persons of all ages who seek to find their place in society, to avoid finding one, or to escape the one they already have found. One can easily understand why Doonesbury's friend Zonker Harris lives in constant terror that he might accidentally graduate and have to face the "real world."

Universities are thus in the fortunate position of offering both services that are essential and services that are enjoyable, and there is little overlap between the two. In this age when sales of electronic games exceed those of scientific computers; when recreational vehicles offer better investment opportunities than construction or farm equipment; when there is a greater demand for Nike running shoes than Wolverine work boots; the latter aspect of universities may well be a better guarantee of continuing support for them than the former.

In the years just ahead, the research activities of universities are, no doubt, going to experience many changes. The principal change I foresee is a closer, and very fruitful, tie between universities and industry. The beginnings of this new academic-industrial complex are

already very visible in the fields of recombinant DNA, robotics, and micro-electronics. One of its latest expressions is Stanford's Center for Integrated Systems, which is being established with grants of \$12 million from industry and \$8 million from the Department of Defense. Similar centers are being established at MIT, Rensselaer Polytechnic Institute, and the Universities of Arizona, Minnesota, and North Carolina, each of them under joint corporate and state or federal funding. All are being organized to facilitate, indeed require, close association and continuing interchange between the centers and their corporate sponsors.

These new alliances are the happy conjunction of two somewhat unrelated trends. First, the decline of federal funding for support of research has forced universities to seek financial support elsewhere. Second, industry has realized that universities have practically unequalled pools of scientific, medical, and engineering talent that are available—indeed, usually eager—to do research for practically any respectable organization that will finance it. And, because nearly all universities are subsidized in one form or another, industry can get its research done at lower cost at school than in-house. Moreover, in the university laboratories, the research sponsors have the benefit of a continually renewed stream of the most original, creative, productive, and, I might add, inexpensive researchers of all: graduate students—those wonderful amplifiers of ideas and energy.

The evolution from federal to industrial support is, I believe, quite a natural and a healthy one. The years of federal dominance of research support and guidance demonstrated that it is possible to negotiate the rocky passage between the Scylla of academic abhorrence of accountants and accountability, and the Charybdis of bureaucratic meddling and misconception. I foresee that the axis between academia and industry will build on the pattern of producing results within budget and on schedule that is a requirement of many of the federally supported programs. Moreover, coalitions with industry have the added benefit of keeping university research relevant—of preventing basic research from deteriorating to aimless research, and of discouraging enjoyable research from passing as fundamental. I do not share the concern some have expressed about industrially sponsored research being too mission oriented. I recall the example of Pasteur, who made his greatest and most fundamental discoveries in the course of solving specific, real-world problems. In Pasteur's words: "There is no fundamental distinction

between pure research and applied research; there is only science and use of science." In my own words, the distinction between basic and applied research is more one of attitude than of approach.

The conclusion I draw from the foregoing considerations is that a new source of research funding and, more important, of challenges, is being opened to universities by the emergence of the academic-industrial complex. It provides the prospect of universities making contributions to the peace-time prosperity of America comparable to those they made to its war-time defense in the 1940s. There remains only for us academicians to make the overtures to our industrial counterparts and, with them, to plan how we can proceed beneficially in consort.

John F. Kennedy

ON SECOND THOUGHT, I THINK WE SHOULD KEEP
THESE COLLEGES GOING

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On second thought, I think we should keep these colleges going. Take myself. I testify. First, the grounds are beautiful and the Iowa River can shake a soggy day into wonder. If the mountains here are subtle, the Iowa sky is the biggest pair of wings around. And love can go a long way on the plains to find what it needs.

I testify. I admit failure and doubt. Schooling has the faults of human beings. I have taught entire years without once apprehending the whole thing, the main thing or the first thing. For the lesson of the humanities may be that yesterday's lesson is no lesson at all. Pindar asked, "What are we? What are we not?" No wonder we envy the birds their "get up and go." No wonder we fill our yards with visible age and full flowering. But still there isn't another growing thing on this rocky apple in the skies which tries to distinguish truth from convention. Not even a fox. Not even an owl.

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Now comes the time when everyone wants
something from the birds, from the trees.