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Science Is Universal—The Practitioners Are Not

It is commonplace in the community to approach the debate concerning the level of federal support of science and engineering by emphasizing the importance of research accomplishments. Lost to sight is the great contribution of the research universities in educating scientists and engineers. Usually attention is called to advances made or to shining goals perceived. This is intended to demonstrate the value of basic research in the United States, with the implicit understanding that the major portion of public funds will be used at universities.

The argument is made that the yield of research from educational institutions has been important to the nation and that the continuation of the process is necessary. The system has indeed worked well, and the basic knowledge of nature so developed has been vital in the sequence of science to technology to ultimate use. Unfortunately, the science and engineering communities are finding shortfalls not only in their minimal annual expectations but also in the now widely accepted belief that there is extensive deterioration of the necessary supporting infrastructure—that is, facilities, equipment, and their support.

With all these accumulated problems it is surprising that the principal reason for continuing with the arrangement that we use in this country is either left out of the argument or, at best, used only as a secondary item. It is not recognized that although science is universal, scientists and engineers are a national resource.

The world requires technology of an ever higher order just to maintain itself, and the country requires the highest order of technology to maintain its leading position. It follows that the availability of a sufficent number of educated, high-quality scientists and engineers is crucial. Thus, the main reason for the use of pooled public funds (whether federal or more local) to support basic research in universities should be to ensure a steady stream of such people. Our system has done this well and provides good science, too, and it is in the country's best interest that the successful system be properly maintained.

There is currently furor about the inadequacies of our precollege school system, and that furor is based in large part on a perception of a lack of technical capability in the nation. This capability, which involves doing science, understanding science, translating science, and using the translation, must be fostered by an educational system both before and after 12th grade that is able to produce a suitable number of educated scientists and engineers. Past the college level the influx of federal, state, and private funds has done well so far in providing not only a steady stream of educated scientists and engineers but good science as well.

The point at issue here is understood in a recent National Research Council report entitled "Renewing U.S. Mathematics." On the first page the loss of support for mathematics is noted, "There has been declining attention to support of the seminal research," as well as the fact that "opportunities for achievement in mathematical research are at an all-time high." The report does go on to note the paucity of mathematicians, but by the thesis advanced here the order as well as the emphasis would be reversed.

Although we are properly impressed by fine ideas and impressive new salients into our ignorance, we are often bemused by a less rational view of such things as ranking—"number one" and other such competitive trappings that develop in a vain desire to simplify evaluation of a complex system. This leads to an exhausting attempt by each field, each institution, each individual, to be number one. I have no interest in stifling ambition but intend rather to suggest that the process of educating individuals, because of the relative anonymity associated with it, has not maintained its proper preeminent position. This has also led to the ambivalent way in which the community has tried to support its legitimate call on tax funds.—NORMAN HACKERMAN, *President, Rice University, Houston, Texas 77251*