COMMENTARY

TRAINING IN APPLIED SCIENCE

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The United States Government is spending today fifteen billion dollars a year on research. It is estimated that of this amount 90% is spent on applied science.

Let us contrast this with education and the work at our universities. Here, with the help of the United States Government, of local governments, and of foundations, at least 90% of the support for instruction in the physical sciences is given over to pure science. In the important field of applied science very few people receive their advanced education. As a result, the great amount of money spent on applied science by our government is not spent in the best possible manner.

Fifty years ago the United States was the unquestioned leader in applied science. Today our position has been called into question in space exploration, in meteorology, in oceanography, in high-pressure physics and perhaps also in metallurgy, aeronautics and atomic energy. In all these fields Russian progress is impressive.

There are only two fields of important applications in which it seems that we retain substantial leadership. These are the development of new electronic devices and the construction of high-speed computers. It is noteworthy that in both of these fields the initiative has been taken by private industry rather than by the Federal Government. In neither case have we placed particular emphasis on secrecy. Our leadership has been maintained by ingenuity and speedy progress.

In spite of these important exceptions we have reason to worry. Applied science today will be turned into comforts and national safety tomorrow. If the Russians educate the best applied scientists, they may become the leaders in decisive fields of technology; this may easily happen in our lifetimes. We must, therefore, find ways to improve education in applied science to inspire some of our ingenious youngsters to transform new scientific discoveries into tools which will serve mankind.

I believe such education can best proceed in some of our excellent laboratories that specialize in applied science. Examples of such laboratories are the Bell Telephone Laboratories, the IBM Laboratory, and some of the laboratories of the AEC. Many of these laboratories live on past capital. They have built up their staff at a time when in our universities the difference between applied science and pure science was not as great as it is today. The trend of the last years has been an increasing emphasis on pure science so that in our universities few of the really excellent students are turning toward applications.

The scarcity of young men is particularly keenly felt in newly established applied science laboratories which are in a less favorable position to attract these young people and which have difficulties in reorienting their young employees toward applied work.

The education of a graduate student consists in part of factual information. However, it is equally important that the student be inspired toward the highest goals in his field of endeavor. At our universities the best professors are dedicated to pure science. In our best laboratories of applied science the leaders have given their life's work to applications. It is in the latter places that the young men will find the proper atmosphere which will allow them to grow up to become effective contributors and innovators in the progressing scientific and technological revolution.

The old tradition of practical inventiveness has deeper roots in the United States than in any other part of the world. Yet these old endeavors show signs of weakening. If our effort should suffer in future decades, this will have the most serious consequences on the future of the free world. But apart from any practical or political consequences, it would be a great pity if applied science with its particular challenges and particular rewards would not continue to grow in its first native land at a time when the prospects of applied science have become, in the most literal sense of the word, unlimited.

Edward Teller