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Assessing the Demand for Scientists and Engineers

Energy research and development is budgeted at $1.8 billion for fiscal 1975; the total federal research and development budget of $19.6 billion is up 17 percent over last year. An effort of this magnitude over the next several years will require large numbers of scientists and engineers trained in a variety of traditional and interdisciplinary fields.

The number of physical scientists and engineers graduating each year is decreasing. These fields accounted for 20 percent of all bachelor's degree recipients in 1950, 14 percent in 1960, and 8 percent in 1971. The National Center for Educational Statistics projects a drop to below 5 percent by 1982. These disciplines constituted 29.2 percent of all doctorates granted in 1965, but are expected to make up only 21.2 percent of the total in 1975 and 17.7 percent in 1982. The increasing size of the college population resulted in a slight rise in the actual number of degrees granted in these fields during the 1960's, but this is no longer true. In both physics and chemistry, the number of bachelor's degrees started to drop in 1970, Ph.D.'s in 1971. Engineering bachelor's peaked at 44,190 in 1972, but will drop each year through 1976, when the class may total only 28,000.

The Council of Graduate Schools reports that graduate enrollment in physical sciences and engineering fell more than 8 percent between autumn 1970 and autumn 1972. A further drop is likely this year.

Meantime, federal support for full-time graduate students in physical science and engineering has dropped steadily from 41.8 percent of those enrolled in doctoral programs in 1969 to 39.8 percent in 1970, to 37.0 percent in 1971, and to 35.8 percent in 1972.

Some signs of technical manpower shortage are appearing already. The College Placement Council reports that 59 percent of all offers made by business and industry to 1974 graduates with the bachelor's degree have been made to engineers, who make up only 5 percent of the graduating class.

News stories of unemployed scientists and engineers proliferated in the early 1970's, as did articles on the "Ph.D. glut." Few of the latter differentiated among fields of study. The best statistics now available indicate that fewer than 1500 doctoral holders in the physical sciences and engineering were unemployed and seeking employment in 1973—an unemployment rate well below 1.5 percent.

Demand for technological specialists will be generated by the nation's energy program, its environmental, and other efforts. Whether enough scientists have been and are being trained in the areas in which they will be needed is not known. Because no federal agency has overall responsibility for manpower planning, top-level representatives from those agencies involved with national research and development programs (including at least the Federal Energy Office, National Aeronautics and Space Administration, Office of Management and Budget, National Science Foundation, and Atomic Energy Commission) must examine together the manpower implications of their several and collective segments of this enterprise and set up or fund a program for continuing assessment over the coming decade. Without it, we may be condemned to repeat our recent mistakes, generating expensive crash programs to produce required specialists, only to follow once again with periods of uneven oversupply. Only adequate manpower assessment can reconcile the long educational pipeline through which these experts must pass with the needed manpower component in the current national effort and the likely emphasis of major programs that will follow when such problems as energy have been solved. Dollar budgets can be changed quickly. Manpower budgets require longer planning time if both dollars and manpower are to be used wisely.—BETTY M. VETTER, *Scientific Manpower Commission, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036.*