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Manpower or Mind Power

Numbers are the standard yardstick in studies of scientific personnel. They are the measure employed in comparisons of our scientific effort with the Russians' and are commonly used in government reports. This emphasis is disturbing. It carries the implication that scientists, like nuts and bolts, are interchangeable and can be mass-produced. The latest report exemplifying this tendency is entitled "Meeting Manpower Needs in Science and Technology" and was released 12 December by the President's Science Advisory Committee. The document calls for an increase in the number of Ph.D. degrees granted in the engineering, mathematical, and physical sciences from 2,900 in 1960 to 7,500 in 1970. To reach this goal the report proposes increased subsidies for graduate students. Given sufficient federal support, large numbers of men can be persuaded to undertake graduate study. Will such a program produce excellence?

Unfortunately the report barely mentions quality and offers no other inducement to scholarship than financial security. This is not astonishing. All of us can understand numbers and money. But who can measure or inspire creative genius? Scientists vary greatly in their effectiveness. One Enrico Fermi is more valuable to the nation than a thousand ordinary Ph.D.'s. When we increase the number of Ph.D.'s do we increase or do we diminish the probability of fostering such geniuses? I suspect that in the recent expansion of science quality has been diluted. This impression is based in part on my evaluation of some recent Ph.D. theses which would barely have earned an M.S. degree in an earlier period. Many papers today seem pedestrian. The experimental equipment employed usually is superb; the idea content too often is thin. Some graduate students in more than one eastern school are on the job only 40 hours a week. A desirable standard is more like 70 to 90 hours. This development indicates lack of motivation. A gifted individual has nothing if he is without drive and a sense of direction. A man of moderate endowment may show flashes of genius if he struggles hard enough. Some of the great scientists of the past were comparatively free from financial pressures; others were creative in spite of adversity. Most individuals seem to need a hardening experience to bring out their best. Giving such people financial security is as likely to hurt them as to help them. The Great Depression was a valuable experience for some scientists who were in their formative years at the time. Turning away from the negative aspects of lack of money, they emphasized the search for truth, the love of knowledge, the joy of discovery, the esteem of colleagues. Will these values seem important to the additional students who are lured into graduate school by increased subsidies? Implementation of the report should produce a fine crop of technologists for industry. It may diminish the number of gifted individuals with the necessary motivation to be truly creative. We hope that in planning for future manpower less attention will be directed toward numbers and more toward quality. The current report is the first in a series. Perhaps a later document will deal with these difficult but more important aspects of this national problem.—P.H.A.