

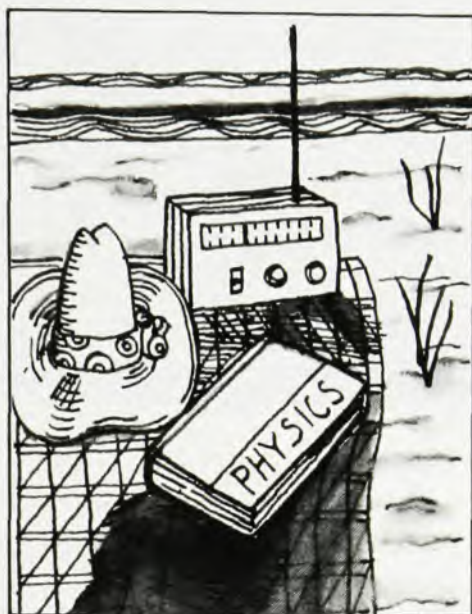
Physics for people

How should society cope with the excess production of PhDs in English? By reducing the number of undergraduate majors in English? By reducing the amount of effort, imagination and money put into undergraduate English teaching? Before you smile at the inappropriateness of such solutions, replace "English" by "physics" in these questions. In fact, we physicists have designed our undergraduate programs primarily to supply students to graduate physics programs. Now that the rate of production of physics PhDs is clearly too large, this misconception about the role of the undergraduate physics major is coming home to roost.

In the National Science Foundation budget submitted by the Administration to Congress this year, educational support—a large part of it for undergraduate education—was \$28 million less than last year. (Fortunately, Congress seems to be restoring most of this financial cut.) Presidential Science Adviser Edward David Jr is quoted in a recent issue of *Science* (12 March 1971, page 986) as saying that the Administration is "trying to cut back on the rate of increase of the pool of scientists and engineers." This is a desirable goal. But a sharp reduction in the support of undergraduate science is an unfortunate choice of means to this end.

On a smaller scale, the American Institute of Physics, in response to its own budget stringencies and guided by advice from representatives of its member societies, is reducing its expenditures for educational activities, most of which are directed to undergraduates. I can not be sure, but I believe that the thinking on the part of some of the advisers was "Why spend money on education? We have too many physicists already."

I believe that we teachers of physics have only ourselves to blame for this situation. To use a word currently popular on the campuses, we have been "elitist" in our attitude toward the undergraduate major. Physics now accounts for less than 0.7% of all bachelors' degrees, far too small a fraction. More than 60% of these physics bachelors pursue graduate study in physics. These numbers tell the story. We have abdicated to our colleagues in other departments the job of providing an



interesting program for students who want to major in a subject without a professional goal in that subject.

Given the typical pattern of our undergraduate instruction, it is in fact logical—however regrettable—to cut down the PhD production rate by discouraging undergraduate majors. Yet we should be going in exactly the opposite direction, rising to our responsibility to educate *people*. One-semester "Physics-for-Poets" courses, commendable though they may be, are not enough. We need interesting and meaningful major programs for future teachers, lawyers, physicians, businessmen, authors and it was good to learn, at the AAPT meeting in Beloit, Wisconsin, in June (Session A) that several institutions are now developing such programs.

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Indian summer institutes

I was gratified to read the positive assessment of the Indian Summer Science Institutes given by Pamela T. Lindstrom in her recent letter (April, page 61). The attention of your readers should also be called to Lester Paldy's article on a Bombay institute, which appeared in the February 1971 issue of

The Physics Teacher. Mrs. Lindstrom notes correctly that the probability of finding a satisfactory institute may be greater at a college situated in a metropolitan area such as Bombay than in a provincial center, and indeed the quality of the institutes offered during any one year do vary considerably. Nevertheless, having been associated with the program in several capacities since 1967 I would agree that in general its overall effectiveness has improved remarkably and has evolved in the directions most appropriate to Indian conditions. Not only have the materials used become more Indianized and the teaching methods less traditional, but in addition a greater fraction of the institutes on both the secondary school and college levels are devoted to specialized topics.

Although we at NSF would like to claim some hand in these developments, the bulk of the credit goes to our Indian colleagues and to the many dedicated US college and high-school physics teachers who have served as institute consultants since the inception of the program in 1964. Contrary to what Mrs. Lindstrom states, however, the institutes are financed entirely by the government of India. NSF's financial assistance consists only in paying the salaries, travel and living expenses of the US consultants. During 1966 and 1967, the peak years of our participation, one or two consultants were sent to almost every institute. Since then the US input has been phasing out, so that beginning this year NSF is sending consultants only to special-purpose institutes as requested by the government of India. The program is now almost completely an Indian one and has become a more or less permanent and self sustaining feature of the educational scene here.

During the years of its existence the summer science-institute program has had a considerable effect on the structure as well as the content of Indian science education. It has got a number of prominent university scientists involved in the problems of school and college education, led to the identification of young, potential educational leaders in all parts of the country, brought the desire for meaningful educational reform down to the level