

College changes urged

Special courses for prospective high school physics teachers are needed to combat disinterest, commission says

by Dietrick E. Thomsen

"You can't be literate and educated in this time and place unless you understand some physics," says Dr. F. James Rutherford, executive director of a project to reform physics teaching. If he is right, America is turning out a lot of illiterate graduates.

Many of American high school graduates do not go to college; if they are to understand anything of physics, they must do so in high school.

But high school physics today is in serious trouble. There is a desperate lack of well-prepared teachers. Two-thirds of all high school physics courses are taught by teachers with fewer than 18 semester-hours of physics in their background—a far worse score than any other high school science. (For biology the figure is 21 percent; chemistry, 34 percent; math, 23 percent.)

Things may get worse before they get better. In 1966 only 505 college seniors were expected to graduate certified to teach high school physics; 336 of these were expected actually to do it. The estimated demand for beginning physics teachers in the same year was 572.

The figures include only people who spend more than half their time teaching physics. Including all those who have to teach some physics can raise the estimate as high as 1,700 new teachers who need some knowledge of physics.

In spite of the need, the potential high school teacher is too often the forgotten man in college physics departments. University physics departments are traditionally led by people with strong interest in research. The bachelor's degree programs have been conceived as entree to graduate school—and the ultimate production of a new generation of researchers.

A survey by a panel of the Commission on College Physics discloses that high prestige departments rarely have programs to prepare high school teachers. Typically these departments graduate two or three teachers every five years. Thus the heaviest burden of teacher preparation falls upon the teachers colleges—the reverse of the situation in other sciences where a majority of teachers come from university or liberal arts college departments.

The commission, which was estab-

lished in 1964 by the National Academy of Sciences to survey possible reforms in college physics, wants to change the situation. It would have university physics departments take the same role in physics teacher preparation as their counterparts do in other sciences. Some may argue that the preparation of teachers is best left to teachers colleges; university departments, after all, have other justifications for their existence. But, the commission points out, the teachers colleges cannot produce sufficient numbers.

A new university curriculum designed for physics teachers should be instituted, the commission feels, and it is now trying to find a university that will set up a pilot program. It would have to be an institution large enough to maintain a sequence of courses entirely separate from the research-oriented bachelors.

The commission does not believe that joint classes between future teachers and future research physicists would be beneficial; the nature of their needs is too different.

What the prospective teachers would get is a course including large doses of history and philosophy of physics and its place in modern society—topics seldom if ever found in the traditional physics-major curriculum. In return they would not be expected to master working details not relevant to high school teaching: "They do not need to be able to do quantum mechanical calculations."

Indeed, mathematics in general becomes something of a bug-bear. During the recent Washington meeting of the National Science Teachers Association (SN: 4/13 p. 352), some of the participants were certain that not only quantum mechanical calculations but any kind of math at all was responsible for scaring away potential students and teachers alike.

There were calls for teaching physics entirely without mathematics. But the proponents of such a course did not spell out in detail how they could teach this most mathematical of sciences without any mathematics, and still achieve any of the understanding Dr. Rutherford and others are so keen to create.



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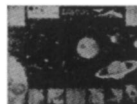
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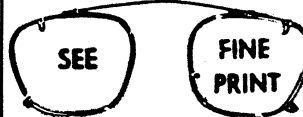
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