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Japan Points a Way

In many sciences, as in biology today, the conceptual fabric has changed fundamentally in the past 15 years. Together with the important task of resynthesizing our knowledge, new and old, we face the imperative task of retraining teachers at all levels, but especially in the lower schools. It is no longer endurable to permit teachers to continue using a stock in trade acquired 30, or even 15, years ago. Summer institutes are only a partial answer. In 12 years they have involved only about one-third of all our secondary-school science teachers, and those, because of qualifications for admission, the better ones. Moreover, the courses provided in summer science institutes often do not present material prepared to bring teachers up to the level of modern thinking across the advancing front in biology, chemistry, physics, or earth sciences.

In the United States the principal effort toward reform has been the curriculum studies, which are producing a revolution in American high school teaching and will shortly pose serious problems for college teachers, presenting them with an influx of better prepared and better motivated students than they are accustomed to expect. In Japan another approach has been developed, one of tremendous promise. Through local pressure from teachers and schools, some of the prefectures began to establish "science education centers" about five years ago. The first ones proved so successful that the movement rapidly spread, until today nearly every prefecture in Japan has such an institution.

Each center has a laboratory for physics, for chemistry, for biology, and for earth sciences. There is a permanent staff, usually of 8 to 12 persons, two or three for each science. A Ph.D. working with two experienced former secondary school science teachers is the usual unit. Groups of 25 to 30 teachers are enrolled in short, specially planned refresher courses and courses dealing with modern teaching methods. Other groups of teachers, on leave from their schools, may spend half a year in residence. Inasmuch as teachers in Japan are regularly employed on a 12-month basis, they can be required to participate in courses given during the school's vacation time; but they are so eager to do so that little suasion is needed. Some centers provide dormitories for the teachers in residence; others depend on local lodgings. Many teachers commute from their homes.

I was privileged to visit six of these institutions, while courses were in progress. The instructors were well acquainted with the new science curricula developed in the United States and were using them as a basis of much of their training programs. Not uncritically, however! Constructive criticism and improvement of the American materials was going on, as well as adaptation for Japanese conditions. One demonstration class of high school students taught by a teacher enrolled in the course was the finest science teaching I have ever seen. The students were led to develop their own experimental investigations of an enzyme in the true spirit of scientific inquiry. Although the Japanese Science Education Centers are insufficient in size to permit rotation of all teachers in any prefecture through them in a period of 5 or even 10 years, their permanent status as elements of a successful local school system is assured. So evident is their success that they are now being expanded to include retraining courses for teachers in all subjects.

—BENTLEY GLASS, *State University of New York, Stony Brook*