Soviet schools are different from ours. Still, America could lose the technological war unless we act.

Soviet Mathematics Education: *A Response*

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Wirszup makes a strong case that the Soviet Union has deliberately set out to train its citizenry in mathematics and science for the technological world. From my experience this is not a supposition but a fact. In contrast, the backwardness of American schools in this regard is shocking. Unless American educators begin to address this issue, we will eventually lose the technological war with the Soviets, the Japanese, the Chinese, the Germans, and others.

However, I would like to make three points. Many are likely to put Wirszup's argument into a cold war perspective and some no doubt are hoping for a post-Sputnik "reaction." The problem should not be viewed in such a simplistic fashion. Recent technological advances are forcing upon the whole world demands for a more quantitatively-skilled populace. It is important for citizens in all countries to live and deal with the emerging technological world. This demand should be seen as an economic problem, not an ideological problem.

Additional training in mathematics and science is an important component of meeting such demands for more qualified workers, but it is not the only component. In fact, the Soviet approach described by Wirszup of expecting all students to cover an increased amount of formal mathematics (particularly calculus) has not been a success. All countries, including the Soviet Union, are struggling with how to include ideas about computer literacy, mathematical modeling, statistics, and so on in school programs. In particular, the Soviets are now quite concerned about the quality of their program. When I talked recently with Soviet pedagogical scholars, they spoke of problems such as: overformalism of the mathematics syllabus, heavy dependence on science materials and equipment that are not available in many schools, lack of exposure to computers and programming, inadequate preparation of teachers, curriculum materials that do not include application of mathematics, unavailability of materials for teaching statistical principles and reasoning in the social sciences, and the difficulty of identifying and dealing with talented individuals. Also, in classrooms I visited, it was apparent that neither the teachers nor the students were interested or excited about their mathematics lessons. They covered them perfunctorily. Students seemed to be performing with little understanding. Clearly, the Soviets have not solved the problem of training people for a changed technological environment. Nevertheless, the Soviets are facing the problem directly and we are not.

A difficulty with Wirszup's paper is that most Americans will read it from an American perspective. Soviet schools are different from ours. Their purpose is different. Soviet schools are designed to train children to become good members of the collective, so completing lessons is a collaborative, not a competitive, effort. Children help each other on assigned lessons. Also, schools in the Soviet Union are not designed to sift the talented students from the untalented and prepare them appropriately for higher education. In contrast, in Western societies, children compete against each other for marks, and college preparation is assumed to be the primary purpose of secondary schools. Soviet schools are organized differently as well. Children in the Soviet Union go to school for eight to ten years (the ten-year school is now compulsory, but in 1979 many of the schools were still only eight-year schools). Thus, most children attend school from age seven to age 16 (roughly equivalent to our grade 2 to grade 11). Classes meet from early in the morning to late in the afternoon, six days a week, for most of the year. Formal subject matter instruction occurs in the morning (math, science, foreign language), and informal "upbringing" in the afternoon (sports, music, political instruction, and so on). The Soviets also assume that individual differences in children are not to be considered in carrying out an instructional program. Children are not put on their own to do homework or assignments. Parents in the Soviet Union are given home assignments and held responsible for helping their children finish the work. Texts and lessons are identical every day in all schools. The teacher's job is not to elaborate or develop ideas but to cover content. The list of differences could go on and on. However, the implications of these differences for the American reader is that while in Soviet schools children are exposed to more ideas from mathematics and science than typical American students. How much of this content is mastered by most students is not clear.

Nevertheless, Wirszup's paper has done us a service. It should be read and discussed. Mathematics and science educators, mathematicians and scientists, school boards and other policymakers should begin systematically to face the problems of preparing our citizenry for tomorrow's scientific and technological world. ■

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