An Overture

Quality and Equality: Both Are Needed

In recent years science educators have made significant efforts to make science meaningful to a wide range of students. These efforts have provided students with equal opportunities to learn science; they have run counter to the idea that science is an elitist subject.

Also, in recent years, some educators have claimed that the quality of science education in the United States is falling behind that of other industrialized nations. They assert that too few of the best students are choosing careers in science and that students not majoring in science are becoming less sophisticated about science. These events are occurring as our world is growing more technologically sophisticated.

Data can be found to support both positions. Let us look first at some statistics that pertain to equality of opportunity in science education, and then examine some statistics that pertain to the quality of science education.

Equality

From 1961 to 1971 about 11% of secondary school teachers spent the largest portion of their time teaching science; in 1976, 13% did so. In the colleges, 21% of the faculty taught science in 1969; in 1975, only 18% did so. However, the change in college science faculty was not distributed equally over all fields of science. The proportion of faculty teaching mathematics and physical sciences dropped from 14% in 1969 to 7% in 1975, while the proportion of faculty teaching biological sciences increased from 7% in 1969 to 11% in 1975. The proportion of earned degrees in science fields parallels to some extent the changes in faculty positions, but a large amount of biology teachers' time was devoted to teaching in health technology programs. The number of associate degrees awarded in these programs increased by 154% from 1970-71 to 1975-76.

Quality

The findings of the National Assessment and Educational Progress (NAEP) testing program generally showed declines in science achievement from 1969 to 1977 in all age categories studied (ages 9, 13, and 17). However, in biology achievement the 9- and 13-year-olds showed significant improvement from 1973 to 1977. The Scholastic Achievement Test (SAT) scores of high school students planning to enter college have also decreased steadily from 1967 to the present, though the scores of students taking achievement tests in biology and chemistry have increased slightly. Scores of prospective graduate students on the Graduate Record Examination (GRE) have also shown small decreases from 1970 to 1975, except in the life sciences and the health professions where they have increased slightly.

Funding for science education from the National Science Foundation, a major source of such funds, exceeded $100 million from 1964 to 1970, but has decreased significantly since then. Fluctuations in appropriations have occurred from year to year in the 1970s; the average appropriation has been about $80 million. During the last two decades, support has shifted from teachers (institutes, short courses, and workshops) to institutions; and emphasis has moved from pre-college science education to college science education, especially at the undergraduate level.

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Looking Ahead in Genetic Counseling

Mobility appears to be a key factor in the ability of graduates to find a position in clinical genetics suited to their interests. At present, the median salary for graduates is $17,000. A genetic counselor/associate often works without peer support because s/he may be the only genetic counselor serving a given hospital; the expansion of the field has already begun to change this situation in several of the large genetic centers. In 1979, the National Society of Genetic Counselors was chartered; and its membership numbers about 200 counselors nationwide. A regularly published newsletter has facilitiated professional identification and communication. Also, in 1979—just ten years after the Sarah Lawrence College Program was developed—the American Society of Human Genetics formed an American Board of Medical Genetics to develop certification procedures for all members of a clinical genetics service—the M.D. and Ph.D. geneticists, the cytogeneticist, and the genetic counselor. All members of the genetics team will take the same examination designed to test for basic knowledge of human genetics. In addition, each individual will be examined in his/her area of specialization. At present, reimbursement by third-party payors for counseling performed by non-physicians is uneven and generally negotiated on a state-by-state or institution-by-institution basis. Where reimbursement for a counselor's services is unavailable, this cost is absorbed by the unit as a whole. Such a policy could, however, endanger the counselor's potential for being cost-effective. Professionalization of the genetic associate/counselor is likely to lead to a better system of reimbursement by third-party payors and will further strengthen the development of this expanding field of medical service.

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Both Equality and Quality Still Needed

Though increases have occurred in the proportion of secondary school teachers teaching science and in the proportion of college teachers teaching biology and health technologies, the gain in equality of opportunity for students to study science has been modest. The NAEP findings suggest that students are becoming less knowledgeable about science, except for the younger students' knowledge of biology.

Scores from NAEP, SAT, and GRE generally show declines in performance; however, students in the life sciences and health professions have demonstrated improved performances. Funds for support of science education have decreased, and this decrease has certainly exacerbated the decline in quality of science students. As biologists, we may take some solace in the observation that some increases in the quality of biology students can be documented. We must not be too self-congratulatory. The increases are not large; neither is our understanding of what produced them.

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