EDUCATION

What people know

Results of a national assessment of education point up some revealing patterns in knowledge of science fields

by Robert J. Trotter

The American educational system is a hodgepodge of facilities and methods. It ranges from the one-room little red schoolhouse in Mississippi to the sprawling, modernistic complex of suburbia, from the severity of the hickory-stick method to the informality of the Dr. Spock school of thought. If student progress resulting from these diverse inputs was properly assessed, educators would be able to point the way to a more productive system.

Ever since the Office of Education was founded in 1867, one of its goals has been to determine the progress of education. Much information has been collected, and reams of facts have been made available. Statistics abound on the number of schools, teachers, buses, hot-lunch programs, students and courses. Unfortunately little has been done to actually assess the final results of the system—to determine just what people know.

In 1963 Francis Keppel, then U.S. Commissioner of Education, began talks with educators about filling this gap. A National Assessment of Educational Development was conceived and put into action. It was funded by the Carnegie Corp., the Ford Foundation for the Advancement of Education and the U.S. Office of Education's National Center for Educational Research and Development. In July 1969 the Education Commission of the United States was set up as the governing organization of National Assessment. This put in charge a body politically responsive to the public through its membership of Governors, chief state school officers, legislators and other lay people.

The first round of data gathering began in the spring of 1969 and was completed in February of 1970. A sample of four age groups was assessed—9-year-olds, 13-year-olds, 17-year-olds and young adults between 26 and 35. The reports provided census-like information about the skills, knowledge, understanding and attitudes of the groups. Reports on science, citizenship and writing were published at the time (SN: 7/25/70, p. 60). However, the information released was "so meager as to be almost worthless," said Dr. Richard Merrill, president of the National Science Teachers Association.

Since then, the supplemental reports on science and writing have been published. They give detailed analysis by sex, geographic area and size of community. Other reports scheduled to follow throughout the 1970's will give breakdowns on such categories as educational background of parents, color, and type of community. In future years these and other subjects will be reassessed in order to provide information about the progress in levels of educational attainment.

It will be years before sufficient data are available to accurately assess the progress or lack of it, but in the meantime the facts and figures being released do give an interesting and sometimes startling idea of what the education system is accomplishing.

Last month, at a meeting in Chicago, the latest results of last year's tests were released. Of the 80,000 persons tested on science it was found that males generally performed better than females of all four age groups. This advantage came from a better understanding of the physical sciences. Girls in the 17 and young adult range, however, showed more knowledge of biology and the human reproductive system than boys of the same age. For example: Males in the young adult bracket were 22 percent better than females in responding to an exercise that required knowing that if two light waves were traveling in a vacuum the one with the higher frequency would have the shorter wavelength. On questions such as one concerning the function of the placenta in a pregnant woman only 31 percent of the males knew the correct answer, compared with 56 percent of the females.

A question in a physical science exercise was: "Most of the chemical energy burned in a car is not used to move the car, but is converted into: electricity, heat, light, magnetism, sound, I don't know or no response." Among adults 33 percent more males than females knew that heat was the right answer.

In contrast, a question in a biological science exercise asked, "Which of the following organs in mammals produces sperm? adrenal glands, kidneys, liver, pancreas, testes." Two percent more women than men recognized that sperm is produced by the testes.

Women also outperformed men in knowing that whooping cough cannot be inherited, that on the average an egg is released in the human female 14 days after menstruation begins and that the sex of the baby is determined by the chromosomes.

In the younger age groups the sex differences were much smaller than among young adults. In the 9's there was almost no difference. In the 13's and 17's the boys began to pull ahead in their over-all performance on all types of science exercises. The females in the 17-year-old bracket tend to show greater knowledge of the biological sciences, similar to that displayed by the women in the young adult group.

In making comparisons on the basis of region, the National Assessment shows that boys and girls in the Northeast at ages 9, 13 and 17 perform about 2 percent higher than the nation as a whole, and that young adults in the West perform about 2.6 percent higher than the country as a whole. In the Southeast performance at all age levels is about 5 percent below the performance of the nation. In the central region ages 9 and 13 perform 1.6 percent and 1.9 percent, respectively, above the level of the national results; ages 17 and young adults perform almost the same as the nation as a whole. At all four age levels there is a decided contrast between the lower performance of the Southeast and the average or above average of the other three regions.

The study points out that the Southeast's deficiency is primarily in areas of abstractions and generalizations taught in formal science courses. The Southeast performs as well or better than the rest of the country on certain exercises that might be answered on the basis of out-of-school experience with gardens, streams, campfires, etc.

In the big cities (over 200,000 population) all four age groups were substantially below the national level. In the urban areas surrounding the big cities all four groups were above the national average. Those tested in medium-size cities (25,000 to 200,000) were also above average, but by a smaller margin. And those tested in the small towns were all below the national results.

This report, as was the case with those issued earlier and those yet to come, does not contain judgments or assessments of individuals, school systems or states. "Instead, National Assessment seeks to indicate areas of strength and weakness in the knowledge skills and educational attainments of American young people," says Wendell H. Pierce, executive director of the Educational Commission of the States. "The reports will be benchmarks for the measurement of progress or lack of progress in the subject matter for years to come." □