

## EDUCATION

# Science Joins Three R's

Scientific education should be aimed at teaching the facts and methods of science and developing scientific talent, school report indicates.

► YOUNGSTERS in the lower grades of school are now learning science almost as soon as they get the famed reading, 'riting and 'rithmetic.

Elementary science is becoming a part of such courses as reading, spelling, history and arithmetic, a report of the National Education Association declared. Dr. Willard E. Givens, executive secretary of the Association, explained that, "Science cuts across our school studies as it cuts across our lives."

In addition to such scientific studies as geography and health, today's grade school students now find science in their other courses. In earlier grades, scientific methods enter into the process of learning to think, the report points out.

Basic to all education, the report finds, are the old, familiar three "R's."

Today's American schools "are teaching them better than they have ever been taught before," and the time spent on these studies in the schools is four times that of a century ago, Dr. Givens says.

Other jobs for schools, pointed up in the report, include:

International understanding, through study of the languages and cultural achievements of other peoples. "Effective study by many people in the United States of the languages of other peoples in the world is a necessary part of world understanding."

Effective citizenship in a democracy by the study of the social studies—history, civics, economics, sociology and geography.

Health, safety and conservation by study and training in the school.

Education as well as training in vocational education.

Moral and spiritual values encouraged in school life, "an important segment" of life itself.

Opportunities in music and visual arts for "the large percentage of American boys and girls who are not getting them."

## Science and Mathematics

The annual report of the National Education Association in an article entitled "Science and Mathematics", states:

Victory in World War II owed much to scientific knowledge, technical ability, and inventive genius. The invincible machinery of this war forced the magic of science and its related arts upon the attention of millions who seldom had given them a thought before. However, for decades, science has increasingly conditioned every basic life need and every important life activity. The achievements of science and its associated skills are the distinguish-

ing characteristics of material progress in the Twentieth Century. Further development in these fields will determine the political, economic, and social patterns of tomorrow. In an address he made to the British Parliament in the midst of the war, Winston Churchill said, "The future of the world . . . is left to highly educated races who alone can handle the scientific apparatus necessary for preeminence in peace or survival in war."

The challenge to the individual is no less than it is to the race. No knowledge he can acquire is more vital to him. No career he may follow offers greater opportunity for personal attainment. Science and mathematics are among our most important school studies.

The citizen who never advances beyond the state of regarding science as a complication of gadgets and miracles will travel through life as a tourist in a strange country. The first general objective of science education is, therefore, understanding and appreciation not only of the facts, but also of the methods of science. This is an objective for all students.

There can be no greater loss than the waste of human talent. The future leaders of science are now in our schools. They must be found, inspired, and guided in undertaking the long and careful study without which even the most gifted cannot greatly achieve in one of the most intricate fields of human labor. A second general aim of science education is, therefore, the discovery and development of talent. This is an objective for a comparatively small number of students whose abilities range from technical skill to creative genius.

In recognition of these objectives, the schools are engaged in reorganizing the school studies that relate to science, and to mathematics which is indispensable to the full understanding and use of scientific facts, as well as to the discovery of many of them.

A program of elementary science is emerging in the early grades. It deals chiefly with understanding and appreciation of scientific facts and methods. It is designed to meet the needs of children, curious about natural phenomena and confronted by problems related to science in their daily lives. The subject matter of science is integrated with the other studies, such as reading, spelling, history, and arithmetic. Geography introduces the pupil to basic facts in astronomy and physics, geology and meteorology. The study of health begins with

elemental facts in biology, physiology, and chemistry. Science cuts across our school studies as it cuts across our lives.

Even in the earlier grades, students acquire some skill in the use of scientific methods. They collect evidence, and weigh it. They generalize on the basis of evidence. They formulate hypotheses and test them before arriving at a conclusion. This is the pattern of all reasoning. In this process, children learn how to think.

More formal studies in science and mathematics begin in the upper elementary grades where there is a greater degree of subject matter organization. General science and general mathematics are offered at the ninth-grade level in many schools.

The three years of the senior highschool offer biology, chemistry, and physics, usually in that order. Laboratory work is an essential part of these studies. Only about five percent of all high school students find time for the complete sequence. In mathematics, the traditional studies of algebra, geometry, intermediate algebra, and plane trigonometry are common to most schools. Only a few students elect more than two of these subjects. Continuance in the highschool of considerable practice in arithmetic skills is a trend worth noting.

In the senior highschool, science and mathematics teachers look forward to a "two-track" program, one of which will be followed by the students for whom highschool is the terminal point in formal education; the other of which will be traveled by those who are on the way to college and perhaps to life careers in the scientific occupations.

For the former, units of study will be drawn from plant and animal life, earth sciences, astronomy, machines, communications, and materials. Many of these can be taught most effectively as a part of world geography, industrial arts, vocational education, or even history and literature.

The smaller group of students will be enrolled in the specialized studies in science, practiced in all the scientific methods and disciplines of these studies, and started on the road to as great achievement as their talents and training lead them.

Science News Letter, April 23, 1949

## INDUSTRIAL HYGIENE

## Showerbaths Are Planned To Keep Air Clean

► SWIRLING showerbaths for dangerous factory exhausts and smokes will keep the atmosphere unpolluted, the American Industrial Hygiene Association was told in Detroit.

A new method of scrubbing gas or air with high pressure water fog can trap even air contaminants that won't dissolve in water, D. G. Hudson of East Lansing, Mich., told the experts. Installations show that it works on gases, vapors and fine particles, and it also dispels bad odors.

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