EDUCATION

Study Science at Six

➤ THE INHERENT curiosity of children is the key to teaching them basic science for understanding the universe and later probing it. A group of University of California scientists and educators urgently believe that science can and should be taught to children at ages as young as six years.

By using a child's natural tendency to approach the physical world directly, scientists and teachers can guide children to methods of scientific and critical observations and habits of thought useful throughout life—whether or not they become scientists.

Recognition of these facts caused the launching of a constructive program at the University at Berkeley, the Elementary School Science Project, started in July, 1959, by four members of the University staff: Dr. Robert Karplus, physicist, whose thoughtful observation of his own youngsters in elementary school first sparked the idea; Dr. Leo Brewer, chemist; Dr. Arthur B. Pardee, biochemist; and Dr. Lloyd F. Scott, educator.

With a starting grant of $43,000 from the National Science Foundation, the program today includes a staff of University professors of mathematics, physics, physiology, chemistry, zoology, biochemistry, botany, and education—as well as research assistants, advisers, and teachers from four "laboratory" public schools in the University area. The project is expected to be in the testing stage for at least five more years.

In the experimental classes, conducted in regular classrooms during school hours, children in grades one to six are being taught to form sound scientific concepts on such weighty subjects as atomic structure, evolution and force. To them, Newton's Third Law, "to every action there is always an equal and opposite reaction," becomes basically comprehended by hooking their index fingers and pulling, or by carefully feeling the force in pushing their toy cars.

Natural selection as a mechanism of evolution, and the effect of camouflage gain significance as children pretend to be birds finding toothpick "caterpillars" hidden on the school lawn or in piles of excelsior, and tabulate and analyze their results. Or functional relationships are graphed on the blackboard as heights of corn seedlings are plotted against time.

Children seem to prefer a direct approach to science subject matter, observed Dr. Robert C. Stebbins, professor of zoology and present chairman of the project. "We have tended to stress where possible, therefore, actual manipulation and direct sense experience through touch, sight, taste, hearing," he said.

The time to introduce science is while children are most open-minded and interested, Dr. Stebbins pointed out. Later, they begin to conform to culture patterns and accept things written in books or stated by other persons instead of finding it out for themselves.

Dr. Stebbins said that there is an undefined period in the growth of children in our present cultural context when many seem to lose their sense of curiosity about the natural world. They are no longer as interested in insects, birds, rocks, stars as they were before—perhaps because they have entered the practical world of applied science and must find a place in a technologically oriented society.

In some school systems, educators wait until high school or college before introducing scientific studies, at a time when cultural indoctrination is well advanced and interest in basic science as yet is little nurtured.

One major problem is to prepare the material so that the teachers can use it, pointed out Dr. Stebbins. The average elementary school teacher today is not broadly trained in basic sciences, and it is not known at this time what steps should be taken to improve the teachers' science training.

"One of our objectives is to find out by experimentation what can and should be taught," he said. Thus the material is being written in considerable detail, and adapted for existing framework at all elementary levels. To supplement the manual, equipment such as clay fish, plastic atom balls, scales, graph paper are supplied by the project staff.

At present there are five courses, called units, being tested and revised: force, coordinates, physiology, animal coloration and chemistry. These units have been composed by Dr. Karplus in physics; Dr. Pardee in biochemistry: Dr. Nello Pace in physiology; Dr. Stebbins in zoology; Dr. Stephen Diliberto in mathematics; and Dr. Chester O'Konski in chemistry.

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UNDER ICE—Under the ice cap 700 miles from the North Pole in northwest Greenland, shuttle cars pick up loads of ice from area where a mechanical miner is digging a large excavation for year-round storage of materiel and housing of personnel in the Arctic. The shuttle cars run on batteries of a type invented by Edison, made by The Electric Storage Battery Company, Philadelphia.

GENERAL SCIENCE

Less Red Tape for Soviet Scientists

➤ SOVIET SCIENTISTS are far less burdened with administrative red tape than ours, an American sociologist claims.

Dr. Norman Kaplan, director of Research Organization Study at Cornell University, Ithaca, N. Y., reported that administrators in Soviet research institutes occupy less important positions than their American counterparts, and have "few if any decision-making responsibilities."

This leaves research directors and other top scientists in Soviet organizations free to make and execute their own administrative decisions on research policies, he said.

Dr. Kaplan, who visited the Soviet Union under a National Institutes of Health grant, said the country's standardized system of salary schedules and employment categories probably helps simplify institutional administration. Another factor is the high status enjoyed by Soviet scientists, who are almost equal in prestige to the highest-ranking Governmental officials.

Dr. Kaplan said a re-examination of large-scale United States research organizations may disclose that many current administrative practices are largely superfluous. Most U. S. scientists, he pointed out, are responsible to laymen who outrank them socially and financially.

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