

GENERAL SCIENCE

Science Interest Peak at Age 12

The importance of junior high school in encouraging the development of young scientists is underlined by a Science Service study, Shirley Moore reports.

► THE REMARKABLE contagion of 20th century science particularly affects 12-year-old boys and girls. At that age when they are exploring the new intellectual, emotional and physical challenges of junior high school, great numbers of young students are likely to discover a personal inclination for science.

Apparently seventh grade offers facts, questions and experiences that stir many 12-year-olds' interest in science. More specifically, seventh grade teachers generate some special momentum of their own.

Graphic evidence of the science-susceptibility of this age group was found in a SCIENCE SERVICE study of the 387 high school students who were finalists at the 13th National Science Fair-International at Seattle last May. Nearly 16% of the high school sophomores, juniors and seniors reported that their interest in science was sparked when they were 12 years old. Exactly half of the 12-year-old beginners became science enthusiasts at school, with most of them crediting their seventh grade teachers for their original impetus.

Data compiled on the finalists at the 13th Fair further underlines conclusions drawn from statistics on 1,682 finalists at earlier Fairs. Each year data are collected on new finalists receiving highest honors at an increasing number of affiliated regional and area science fairs. These fairs, in turn, serve school fairs in more and more sections of the 50 states and in foreign countries. This year each of the 387 projects exhibited at the NSF-I represented approximately 2,500 science projects at the grass-roots level.

But the 12-year-old peak continues to dominate the bar graph showing the ages of original interest in science. The ages of 10, 13 and 14 consistently rise to auxiliary heights, and the chasms of 9 and 11 are still there. Neither the summits nor the abysses show evidence of disappearing into a smooth statistical curve, as might reasonably have been expected.

With half of the 12-year-old starters in this year's group discovering their scientific inclination at school, what influences inspired the other half? Family and friends propelled 22.5%, with fathers receiving the greatest number of credit lines. The remainder of the sources were varied, with a little more than 5% coming from books and magazines, 5% from science fairs, 5% from talk of Sputnik launchings and lunar probes, 3% from kits of scientific equipment, and 3% from scouting activities. Still others mentioned such generators as membership in an astronomy club, the family doctor, and "walking at night and becoming fascinated by the stars."

How have the seventh-grade beginners in science developed as they progressed through junior and senior high school? Did they drop other interests and efforts in favor of science activities? Did their general academic standing suffer?

To answer such questions, a detailed listing was made of their activities and hobbies in senior high school. The list shows a wide variety of sports reported by 65% of the group; musical interests such as chorus and glee club, band and solo instruments by 65%; church group activities by 43%; reading by 43%; school newspaper and yearbook work by 31%; dramatics by 25%; languages by 22.5%; photography by 20%; student council membership by another 20%. Smaller numbers enjoy such diverse pursuits as scouting, camping, fishing, writing, public speaking and debate, stamp and coin collecting, art and handicrafts, ham radio, international projects, dancing, sports cars, model railroading and philosophy.

More than half have been awarded

academic honors for outstanding scholarship and many have won honors in music, scouting, sports, writing, 4-H, drama and speech, languages and citizenship. It seems apparent that these potential scientists are exploring and enjoying all of the world they live in.

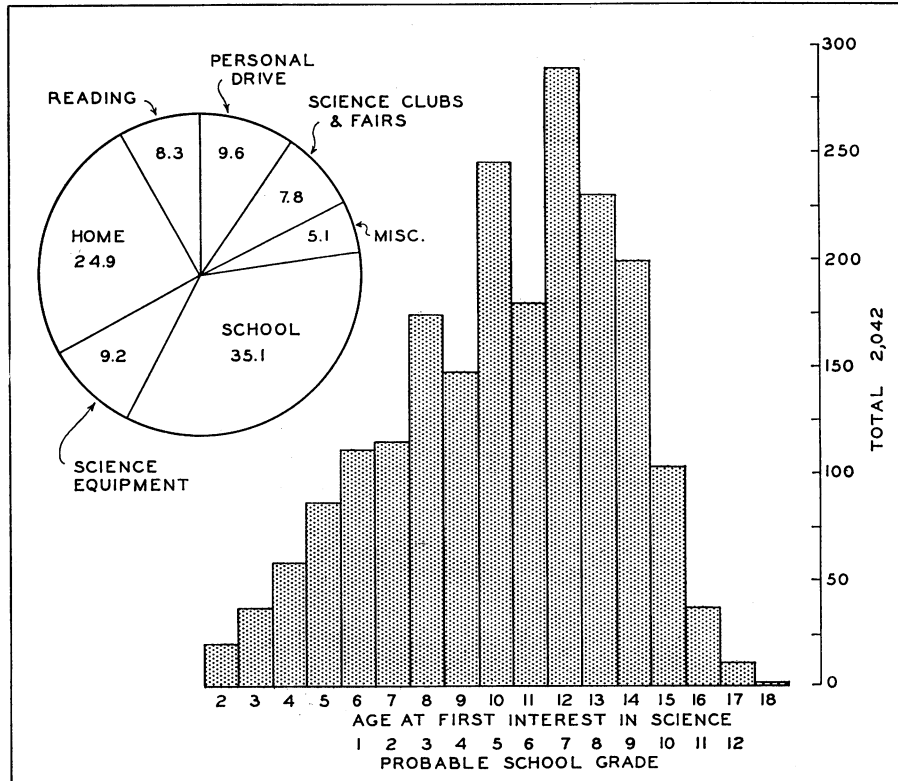
Other Peak Ages

Other peak ages of original science-mindedness reported in the current study include 10-year-olds, indicated by 12.5% of the finalists at this year's international event; and 11- and 13-year-olds, each responsible for 10% of these high-ability future scientists.

Teachers, texts, laboratory experience, demonstrations and equipment at school continue to increase in importance, with 36% of the entire group of 387 finalists crediting these as the source of their personal "itch" to explore the realms of science.

Home influences were significant in the development of 25.7% who felt that their parents or other members of the family, home atmospheres and opportunities, family friends and activities and trips, and similar influences were responsible.

Other sources, mentioned less often, were: books, magazines, pamphlets and other



SCIENCE INTEREST IN YOUTH—These graphs compiled from a SCIENCE SERVICE study depict the complete range of age and source of first science interest in 2,042 finalists at National Science Fairs.

reading material, 9%; scientific equipment and kits, 8%; science fairs, clubs and other organization activities, 7.9%; curiosity, observation, "the need to know" and other personal drives, 7.5%; and such motivating forces as discussion with scientists, visits to scientific institutions, museums and observatories, television programs, and science seminars, 5.3%.

Nearly two-thirds of the finalists came from homes where one or both parents continued their education beyond high school. But 34% reported that neither parent had received any higher education. Of the 55% of the fathers who continued their education, 40% attained degrees including 74 Bachelor's, 22 Master's, 17 Ph.D.'s, 13 M.D.'s, 8 L.L.B.'s, 8 D.D.S.'s and a variety of other professional degrees. Some additional education beyond high school was received by 48% of the finalists' mothers, and 26.6% earned degrees, among which were 89 Bachelor's, 12 Master's and one M.D.

One-third of the fathers are professionally employed; 31.7% hold clerical, sales or service jobs; 15% are in manufacturing and construction occupations; 11.5% are executives, managers or business owners; 5.6% are ranchers and farmers; and 2% are in unskilled jobs.

Teaching Popular for Mothers

About a third of the finalists' mothers are employed and, of these, more than half work in the professions, many of them as teachers. More than one-third of the working mothers hold clerical or sales jobs. Six mothers work in factories, and four are managers or owners. One mother is a farmer.

To be eligible as finalists at the National Science Fair-International, students must be sophomores, juniors or seniors in high school and must have been selected for highest honors by the judges at a regional or area science fair which is affiliated with the international program conducted by SCIENCE SERVICE.

Each fair is entitled to send two finalists to the annual event, held in a different city each year by invitation of groups within the city and state. Finalists' expenses are paid by the science fair they are representing, and they are accompanied by science teachers, fair directors and local press representatives.

When their projects are uncrated and set up in the exhibition hall, their work and their knowledge of their subject are very carefully judged by some 250 eminent scientists, professors, and representatives of professional organizations and Federal agencies. These highly trained specialists, and the thousands of visitors to the Fair, express their reaction to the accomplishments of these high school students in such words as "astounding," "gratifying and humbling," "exciting," and "a refresher course in what young people can achieve, given the motivation and the opportunity!"

Many judges and visitors are curious to know the sources of the original ideas behind these outstanding science projects. Forty percent of the finalists at the 1962 Fair said that they came upon their ideas in books, magazines, journals, pamphlets

and scientific reports. School courses, materials, or discussions with their teachers and classmates inspired the projects of 15%. For 12%, this year's project was the continuation of their previous work or grew out of their long-time hobbies. Plain curiosity, acute observation, necessity, a "brainstorm," and an "accident" accounted for 11% of the springboard questions. New fields of interest or professional work that caught their attention prompted the investigations of 7.5%. Student institutes, seminars, special programs and professional meetings were potent idea sources for 5.8%.

Fourteen of the projects were started by discussions with scientists. Others stemmed from summer jobs in science and work in hospitals and universities, from laboratories in school or elsewhere, from science fairs, from their families and from movies.

Science Careers Planned

Most of these promising student-scientists have their gaze very firmly fastened on futures in the scientific disciplines. Only 2.3% of the 387 finalists plan non-science careers (two as lawyers, and one each as an accountant, banker, high school band director, photo-journalist, language teacher, social worker and minister); and 2% are still in a state of indecision. The other 95.7% look forward to professional careers that include most of the newest specialties such as aerospace biophysics, geophysics and geochemistry, biochemistry, radar, microbiology, solid fuel chemistry and computer programming.

The medical sciences remain well in the lead with 25% of the students planning on futures in medicine in one capacity or another. From 1957 through 1961, medical careers attracted from 20% to 23% of the group, while engineering declined from a 1957 lead of 28% to 18% last year and 15% this year. Microscope and scalpel seem to have more drawing power now than the engineer's slide rule.

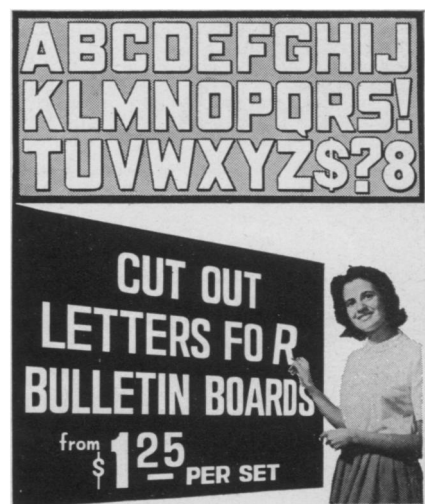
The biological sciences claimed 15% of the aspirations this year and physics 12.4%. Teaching is the goal of 8.7%. Chemistry and mathematics are next, with 7.5% and 5.4% respectively. Some 5.6% are heading for "scientific research" or just "science" without being certain of specific areas.

Studies of finalists at the earliest National Science Fairs, now launched in their professional careers or studying for advanced degrees, have shown that the great majority of this newest group of science-candidates actually will become scientists or educators or both. About half may reasonably be expected to change from one discipline to another as they advance in college and graduate school.

Even those who eventually enter careers quite irrelevant to science will have had a glimpse of its "inexhaustible pleasure." They may, therefore, become somewhat more knowledgeable voters, legislators, financiers, ministers, writers or whatever.

At the very least, they should find it easier to supply enlightened support and a modest amount of advice if their children show symptoms of science-susceptibility and project paraphernalia begins to infiltrate the house and take over the garage.

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