BEHAVIOR

Survey finds trends in reading skills

The National Assessment of Educational Progress (NAEP) conducted two surveys of reading abilities among elementary and secondary school students during the past decade; one was administered during 1970 and 1971, the other during 1974 and 1975. A new survey, for 1979 and 1980, reveals that reading skills of 9-year-olds improved steadily over the past decade while the same skills showed a less consistent pattern for 13- and 17-year-olds.

The national survey questioned students in three skill areas: literal comprehension (identification of a single fact or idea from a reading passage), inferential comprehension (ability to grasp an idea not explicitly stated in a passage) and reference skills (use of specialized skills to solve a problem, such as an index or encyclopedia). Nine-year-olds improved in all three skill areas. Performance on inferential and reference skills remained stable for 13-year-olds, and their literal comprehension slightly improved. While 17-year-olds' performance remained unchanged for literal comprehension and reference skills, it declined significantly for inferential comprehension. Black 9-year-olds showed dramatic improvement over the decade, along with 9-year-olds living in rural and disadvantaged urban areas and those whose parents did not graduate from high school. Black 13-year-olds also improved significantly during the 1970s, but still perform at about 11 percentage points below the national average.

A panel of English and reading teachers convened by the NAEP noted the more significant gains made by 9-year-olds. They cited increased federal funding for elementary school reading instruction and changes in educational materials and approaches as key factors in the trend. But concern was expressed about the lack of progress in higher-level skills at age 13 and the declines on inferential skills at age 17. "In my opinion," said NAEP director Roy H. Forbes, "the reading data for older students indicate that the challenge of the 1980s will be to teach students how to use basic skills, in reading as well as in other areas, in more complex problem-solving and critical thinking activities."

Getting high-risk smokers to quit

Men who smoke and are at high risk for heart attacks can be effectively encouraged to quit smoking and reduce the chance of heart attacks, according to an ongoing 10-year study.

Four-year results of the project, funded by the National Heart, Lung and Blood Institute, were reported in Washington at this month's American Heart Association conference. The experiment began in the mid-1970s and involved 3,795 male smokers at 22 medical centers. From 40 to 45 percent of the men quit smoking after four years in the NHLBI program and have not restarted. Most programs aimed at stopping smoking get between 25 and 50 percent of a group to quit, but up to 75 percent may resume smoking within a year.

The institute's program included consistent doses of anti-smoking education, counseling, hypnosis, weekend retreats, mutual support groups and other methods of encouragement. The men in this "intensive care" group were compared with a control group of smokers who were given only an initial physical, an annual checkup for risk factors and recommendations to see personal physicians. Members of the experimental group also had special tests and follow-up sessions every two to four months and were frequently contacted by health counselors. So far, the "intensive care" smokers have reduced blood pressure, weight, smoking and the amount of cholesterol in their bloodstreams. They have cut their risk of a heart attack by 25 percent compared with the control group. The number of men in the study who have had heart attacks will not be reported before the fall of 1982.

TECHNOLOGY

Catching poisoned catalytic converters

Despite prohibitions against it, a number of drivers with cars designed to sip unleaded gasoline only have surreptitiously fueled their autos on leaded gas to lower the cost and raise the octane of their engine's diet. But cheaters beware. Eric W. Schneider of General Motors Research Laboratories has designed a gauge that will detect lead accumulations in a car's catalytic converter after the illicit consumption of as little as 53 gallons (200 liters) of leaded fuel.

"A measurement can be made in one minute by inexperienced people in the field, without removing catalyst samples from the converter," Schneider says. Though other means of confirming a car's leaded drinking habit exist, Schneider claims his gamma-ray transmission gauge is the first portable and easy-to-use gauge to offer quantitative readings.

That makes it a potential godsend to automakers like GM. Already 29 states are implementing emission-control checks of motorists' cars. And the Environmental Protection Agency currently holds manufacturers culpable for emission-control system failures. With the ability to show that a vehicle's diet has been adulterated, automakers may be able to shift the culpability for servicing or replacement to offending drivers. GM has informed the EPA of Schneider's research and is encouraging use of the gamma-ray gauge to determine catalyst lead contamination. And EPA is reported to be evaluating a lightweight, battery-powered model.

The gauge consists of a "C" clamp-type bar that fits around the converter. In one of its tips is a gadolinium-153 radio-isotope source, in the other, a sodium-iodide crystal (sensitive to radiation) connected to a photomultiplier tube. Radiation emitted by the Gd-153 passes through the converter to the photomultiplier where it is measured. Schneider explains that "attenuation of the radiation beam passing through the converter can be related to the amount of lead in its path." Lead contamination was measured at 11 reference points on the converter during 22 field tests using standard 1978 Buicks. These tests showed lead accumulation is nearly linear during consumption of the first 53 gallons of leaded gasoline and reaches a maximum by 290 gallons.

Thermometer for microscale changes

Anthony H. Francis has developed a thermometer that can measure the rapid and regular temperature changes that signal both vibrational and electronic excitation of molecules. It helps him study the transitory bonds of organic materials, such as pyridine, to metal (catalyst) surfaces but could also help manufacturers of electronic equipment view the interfaces — junctions — in semiconductor devices.

The University of Michigan chemist described his thermometer as being essentially a thin-film resistor whose electrical conductivity is strongly temperature dependent. Only a few hundred angstroms (hundred millionths of a centimeter) thick, it responds quickly, on the order of a ten-thousandth of a second. And it's sensitive: Changes it measures vary by only a millionth or billionth of a degree.

The thermometer is an amorphous thin-film of germanium evaporated onto one side of a sapphire wafer. On the wafer's other side Francis deposits his catalyst. The hydrocarbon to be studied is absorbed onto that. Upon pulsed irradiation with a laser, the organic hydrocarbon absorbs a small amount of energy, quickly dissipating it to the metal below. The sapphire conducts heat from the metal to the germanium, which registers a corresponding pulsed change in resistivity. Besides its relatively low cost, a major advantage of this scheme is that it permits study of optical absorption in real-world environments — such as gas atmospheres at temperatures of 1 to 77 kelvin.