of all 17-year-olds can be considered functionally illiterate. Worse, nearly 40 percent cannot draw inferences from written material and as many as 65 percent cannot solve a mathematics problem requiring several steps.

▶ Scores on standardized tests by high-school students are now lower than 26 years ago when the first sputniks were launched. Average verbal scores on the College Board's Scholastic Aptitude tests plunged more than 50 points in two decades, while math scores fell nearly 40 points. Consistent declines are recorded in physics among 17-year-olds, as measured by the National Assessment of Educational Progress on physical sciences, conducted in 1969, 1973 and 1977.

▶ Between 1975 and 1980, remedial math courses in public four-year colleges increased by 72 percent and now make up one-quarter of all mathematics courses taught in those institutions.

The inadequacies of US education, the commission finds, are imbedded in four important aspects of the whole schooling process: content, expectations, time and teaching. High-school curricula have been "homogenized, diluted, and diffused to the point that they no longer have a central purpose," says the commission.

By contrast, in many other industrialized countries, courses in mathematics (beyond simple arithmetic), physics, chemistry, biology, and geography usually start in grade 6 and are required of all students. "The time spent in foreign schools on these subjects, based on class hours, is about three times that spent by even the most science-oriented US students—i.e., those who select four years of science and mathematics in secondary school," the report asserts. A 1980 nationwide survey of high-school diploma requirements indicates that 35 states call for only one year of mathematics and 36 require only one year of science. "In many schools, the time spent learning how to cook and drive counts as much toward a high-school diploma as the time spent studying mathematics, English, chemistry, US history, or biology," the report laments.

The commission recognizes a "particularly severe" shortage of science and mathematics teachers almost everywhere. Moreover, half of the newly employed teachers in those subjects (as well as in English) are not qualified to teach them; fewer than one-third of US high schools offer physics taught by qualified instructors.

Admitting after its 18-month study that "there is little mystery about what we believe must be done," the commission recommends that:

▶ High-school graduation requirements should be strengthened so that, at a minimum, all students seeking a diploma should achieve a "higher order" of intellectual skills in the so-called "Five New Basics"—meaning four years of English, three years of mathematics, science, social studies, and a semester of computer science.

▶ Schools, colleges and universities should adopt tougher admission requirements, and standardized achievement tests should be administered at major transition points from one level of schooling to another, as they are in such countries as Britain, France, Germany and Japan.

▶ Teaching and textbooks (and other learning materials) should be upgraded and updated to make them more rigorous and current. The commission also calls upon university scientists, scholars, and members of professional societies, in collaboration with master teachers, to prepare teaching materials, "as they did in the post-sputnik era."

▶ Teaching needs to be better rewarded and more respected. Salaries for teachers should be increased, and so should their certification standards.

The report concludes on a note of optimism ". . . our institutions of higher education have provided the scientists and skilled technicians who helped us transcend the boundaries of our planet. In the last 30 years, the schools have been a major vehicle for expanded social opportunity, and now graduate 75 percent of our young people from high school. Indeed, the proportion of Americans of college age enrolled in higher education is nearly twice that of Japan and far exceeds other nations such as France, West Germany, and the Soviet Union."

Citizens need to hold school officials and elected officials responsible for leading the reforms. Beyond that, the commission calls on the National Academy of Sciences, National Academy of Engineering, NSF, and other scholarly, scientific and learned societies to join the effort.

The commission was headed by David Pierport Gardner, now president of the University of Utah. —IG

Keyworth decries scientists' negative reaction to ABM

While much of his speech at the APS meeting in Baltimore in April restated current policy on Federal support for R&D, George Keyworth (Presidential Science Adviser) took this opportunity to admonish "scientists active in arms reduction" for the "strangely dogmatic" position they have taken in response to President Reagan's "Star Wars" speech. On 23 March Reagan called on the "scientific community in our country, those who gave us nuclear weapons," to make "nuclear weapons impotent and obsolete" by devising a defense against ballistic missiles. Keyworth was disappointed in the negative reactions that the President's speech has elicited so far. "Some pointed out deficiencies in systems not yet invented. Others declared outright that the task is forever impossible." He said, "I can't believe they're representative of the views of the community. But unless the community—unless you speak up to widen the debate, we may see a potentially world-changing opportunity stifled by a handful of self-appointed spokesmen."

Keyworth told APS that we do not yet know how to accomplish such an ABM defense. But, he made an analogy between the feasibility of ABM technology and the problem of developing fusion as an energy source. "Thirty years ago—or even today—a skeptic could point out a dozen technical reasons why fusion would never be successful." In fact, "after 32 years and billions of dollars I'd be surprised if we were even halfway to our goal," Keyworth said. He asked physicists not to fall "into the familiar trap of using current experience to evaluate tomorrow's knowledge."

Keyworth also voiced concern about the toll international competition has taken on the US lead in scientific research. "Our world leadership in high-energy physics has been dissipated. In the years American physicists squandered on a porkbarrel squabble, the Europeans moved boldly ahead;" it is now "a time for statemanship, not pet projects," Keyworth said, calling for the cooperation of the scientific community to regain US leadership.

Citing his own efforts in this regard, Keyworth said, he was "kidded by the people where I work about the amount of time I spend on high-energy physics problems." According to Keyworth, he has already begun speaking to Congressional leaders about the possibility of building a Desertron. While noting that a $1 billion to $5 billion investment for 1000–2000 scientists will be hard to sell to Congress, he nonetheless felt that "a 20-TeV accelerator should be taken extremely seriously." Such a machine would allow the US to go beyond LEP at CERN, scheduled to collide 50-GeV electrons and 50-GeV positrons when it comes on line in 1987 (and eventually 130 GeV in each beam) and, the recently approved HERA (proposed for construction at DESY), which would collide 820-GeV protons with 30-GeV electrons. Nonetheless, Keyworth described the HEPAP meeting in Woods Hole in June, as a "watershed episode" for high-energy physics and cautioned physicists about assuming that taxpayers would bear the expense of new accelerators without clear enunciation of priorities from the scientific community. □