

The Cost Is Incalculable

The effects of deteriorating education have only begun to hit

Over the past 25 years America has suffered a staggering decline in one of its most important indices of real wealth: its ability to produce the scientists and technological innovators on which the nation's future economic growth depends.

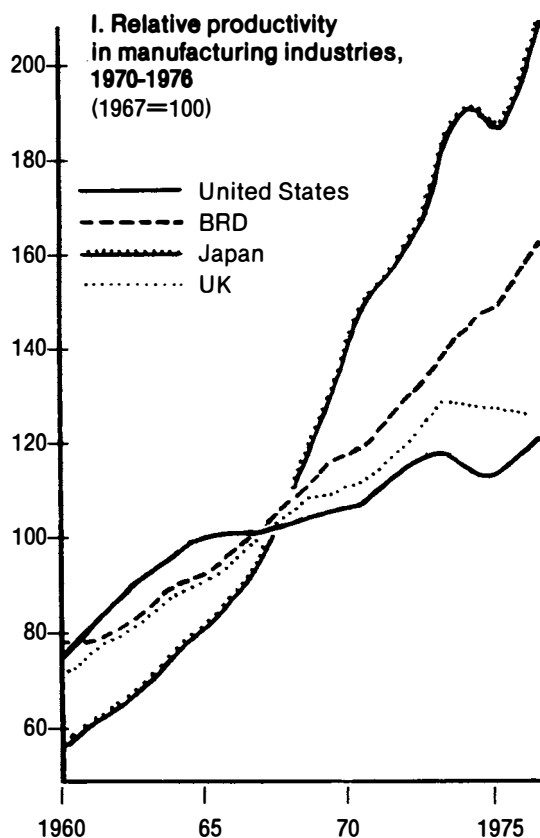
The problem is reflected in many ways. The collapse in the U.S. rate of productivity growth, traceable to a lack of capital investment in technological innovation, is one indicator. Another is the precipitous decline in national expenditure in research and development, and in funding of basic research.

Nowhere is it more visible than in education, which has plummeted since the 1950s by every qualitative or quantitative measure.

There is no way to calculate the total cost to the United States of this decline in research, in basic education, and

in the training of highly skilled scientific cadre. But as Graphs I, II, and III show, the sagging productivity that has crippled the U.S. economy is, lawfully, paralleled by the decline in the scientific workforce and in spending on research and development generally.

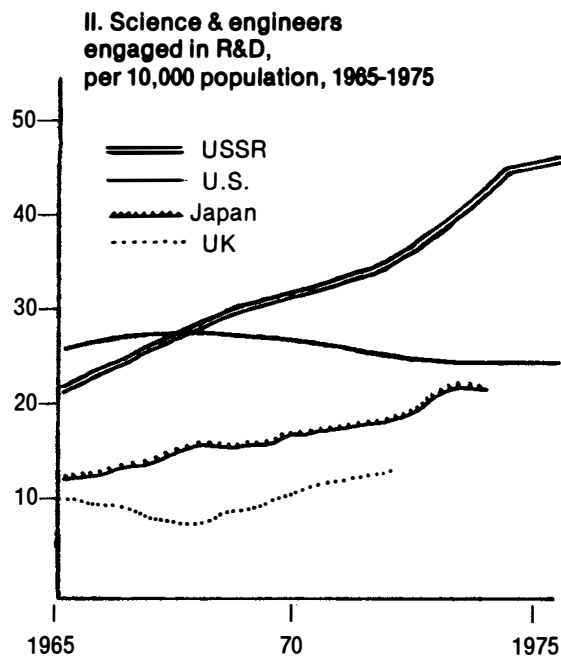
Even more to the point is the observation by the Republican Party's John Connally that the U.S. is losing billions of dollars because it is undercutting its own greatest advantage — its tremendous scientific and technological skills. "High-technology exports produced a surplus of \$29 billion (in 1976), while low-technology exports added a \$15 billion surplus (in the same year)," said the former Texas governor. "That's where we have the advantage, not in throwing up tariffs and isolationism." Graph IV shows the dollars-and-cents necessity for preserving and increasing that advantage, before it is entirely destroyed.



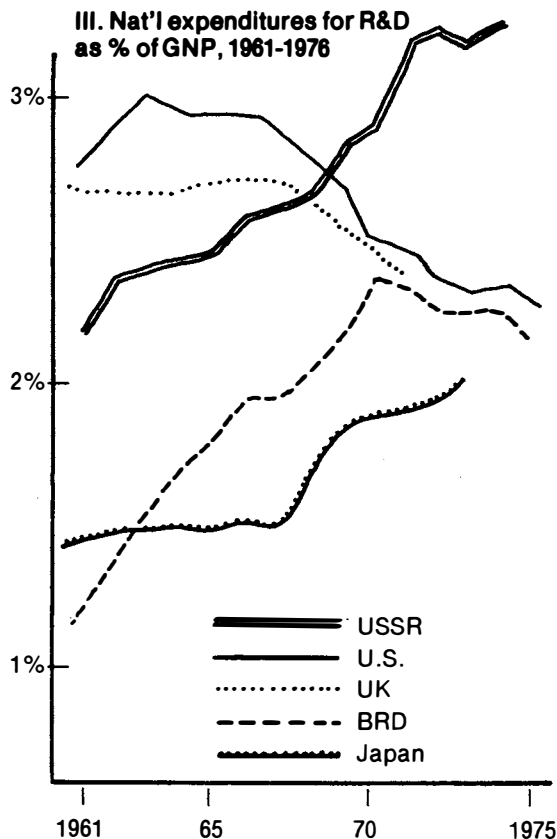
Source: Department of Labor, 1977.

What Happened to U.S. Education?

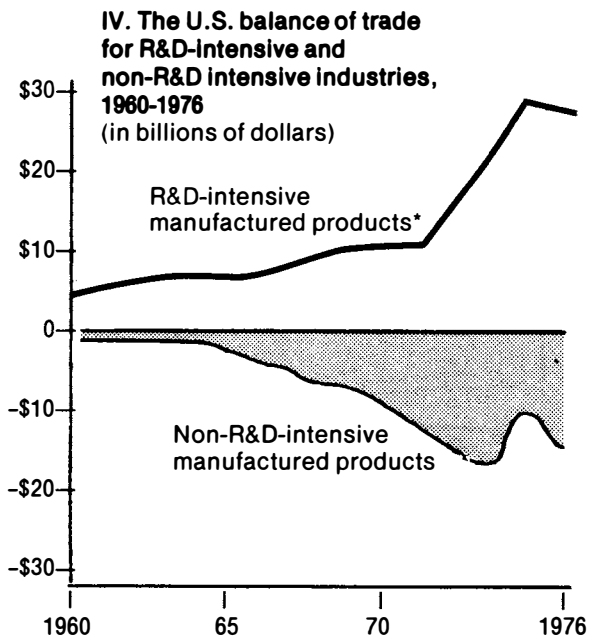
Literacy is way down nationally. The Scholastic Aptitude and Graduate Record test scores for college and graduate-school applicants have dropped consistently



Source: National Science Foundation, NSF-77.



Source: National Science Foundation, 76-310.



Source: Dept. of Commerce Overseas Business Reports, Aug. 1967, April 1972, April 1977.

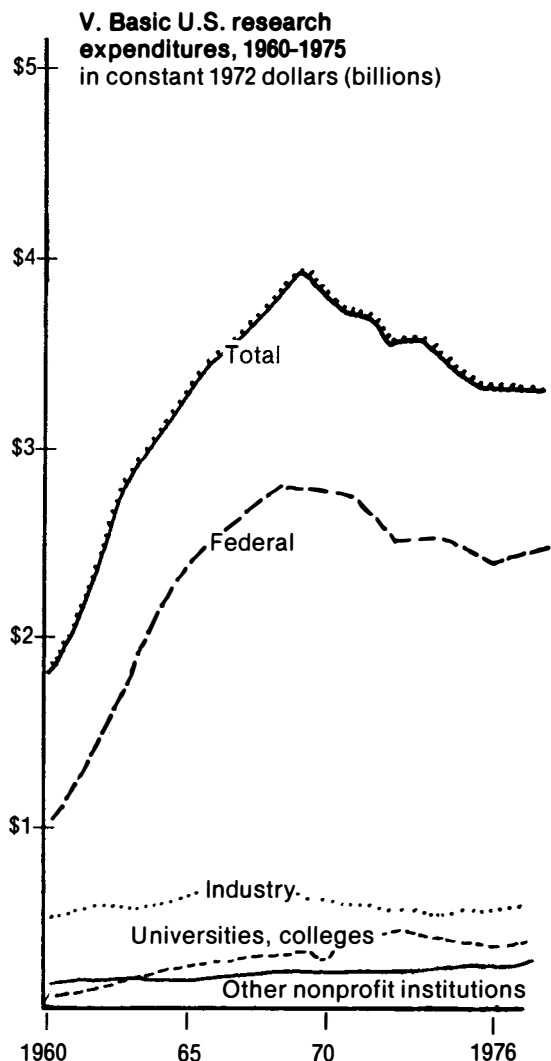
* This category includes: chemicals, electrical and nonelectrical machinery, aircraft and parts, professional and scientific equipment.

since the 1960s. The number of masters degrees awarded in the sciences, including such crucial areas as nuclear engineering, has plunged.

Schools have become little more than babysitting services, to such an extent that 70 bills have been introduced into state legislatures across the country requiring students to reach standards of "minimum competency" before promotion to the next grade. Thirty states have already passed such laws, leading to increases in school performance on national tests over a period of several years.

The high schools whose Scholastic Aptitude Test scores did not drop with the national trend were, without exception, schools that insisted on a "core" of academic courses which students had to complete before taking elective courses. As is well known, since the "relevant" 1960s electives have too often become subjects like "transcendental meditation" and "thanatology," that make the proverbial basket-weaving course look like graduate-level science.

Illiteracy has become a widespread problem. A project



Source: Natl. Science Foundation, 76-310.

on "adult performance levels" by the U.S. Office of Education found that one out of every five American adults (23 million) is functionally illiterate, meaning that reading and calculation are on an 8th or 9th grade level or lower. The National Assessment of Educational Progress estimates that 13 percent of 17-year-old students still in school are functionally illiterate by the same definition.

Most of the trash in newsstands and bookstalls is aimed at this level of semiliteracy. But even this standard may be too high for future generations. The NIE's Curriculum Task Force estimates that the average 10- to 14-year-old child in America spends 1,500 hours a year watching television, and only 1,100 hours a year in school.

Yesterday and Today

The landscape of American education and culture today looks particularly bleak when compared with that during the post-Civil War period of rapid industrial expansion. A hundred years ago the country's intellectual elite, although a relatively narrow segment

of the population, was literate in not only English but often Greek, Latin, French, and German, and familiar with Plato's dialogues, Milton's poetry, and Leibniz's writings in the original. Among broader layers of the population, Shakespeare and an extremely broad range of scientific materials were widely read.

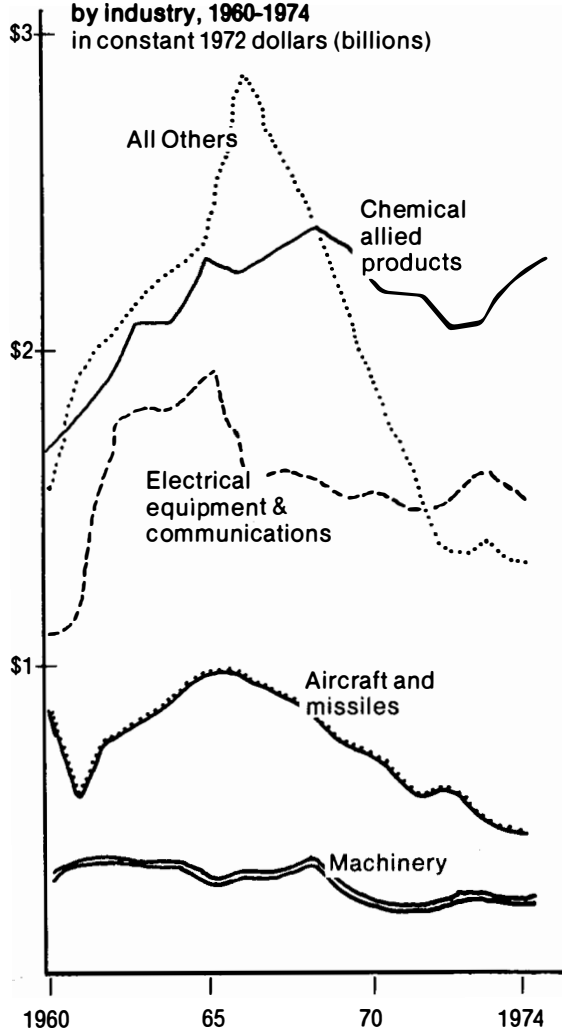
Contrast the high value placed in those days on the tradition of humanist education and scientific research, despite the smaller economic base of that era, with the situation today, when, for example, the U.S. Navy reports that nine out of every 10 applicants cannot even fill out the screening test, let alone pass it. The Navy's chief of personnel cited one recent case in which \$250,000 in damage was done to a diesel engine because the sailor working on it could not read the maintenance manual.

That industry is suffering keenly from the same problem is evidenced by the results of a recent Conference Board survey showing that more than one third of U.S. companies employing over 10,000 people have begun remedial basic education programs for their workers.

Science Undercut

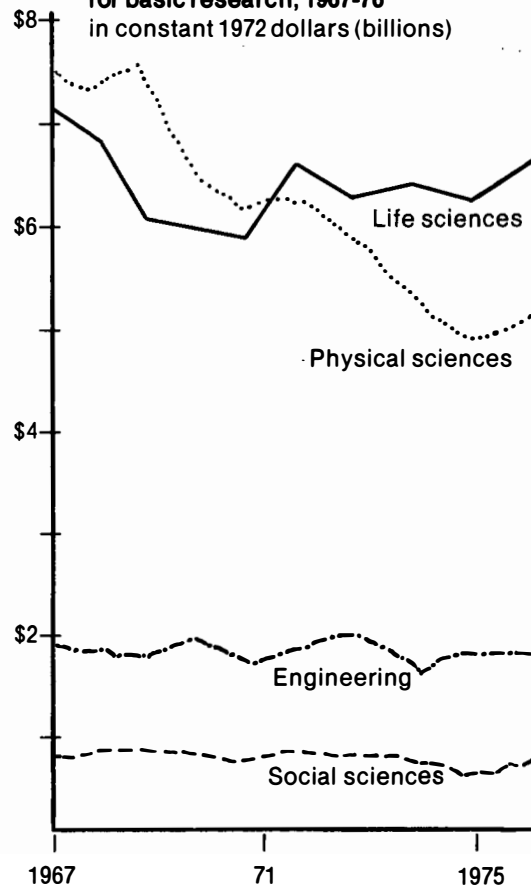
The dismal picture on the bottom end of the educational spectrum is only a reflection of the collapse of higher and particularly advanced scientific education.

VI. Expenditures in basic research by industry, 1960-1974
in constant 1972 dollars (billions)



Source: Natural Science Foundation. 76-322.

VII. Federal obligations for basic research, 1967-76
in constant 1972 dollars (billions)

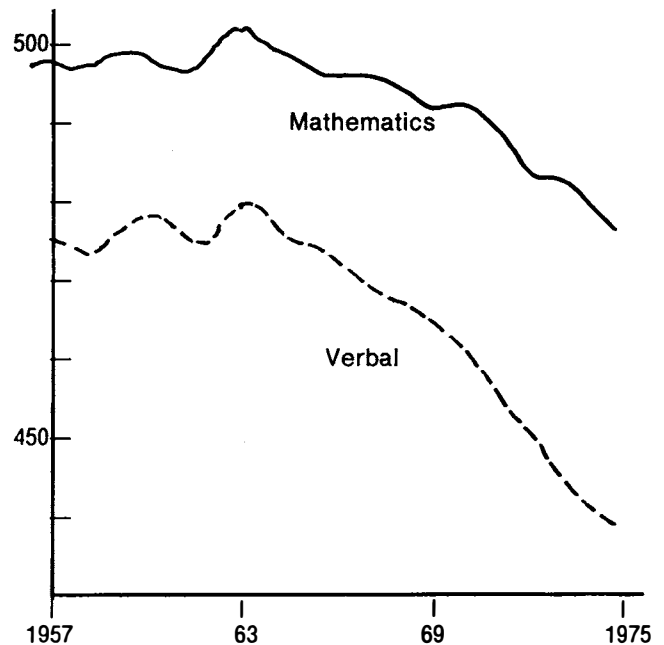


Source: Natl. Science Foundation, NSF-77.

In the middle 1950s, as the U.S. began to experience a decline in its contribution of technological innovations relative to the rest of the world (Graph IV), the National Science Foundation and other public and private institutions undertook a major campaign to improve scientific education and increase the number of scientists recruited from the student population.

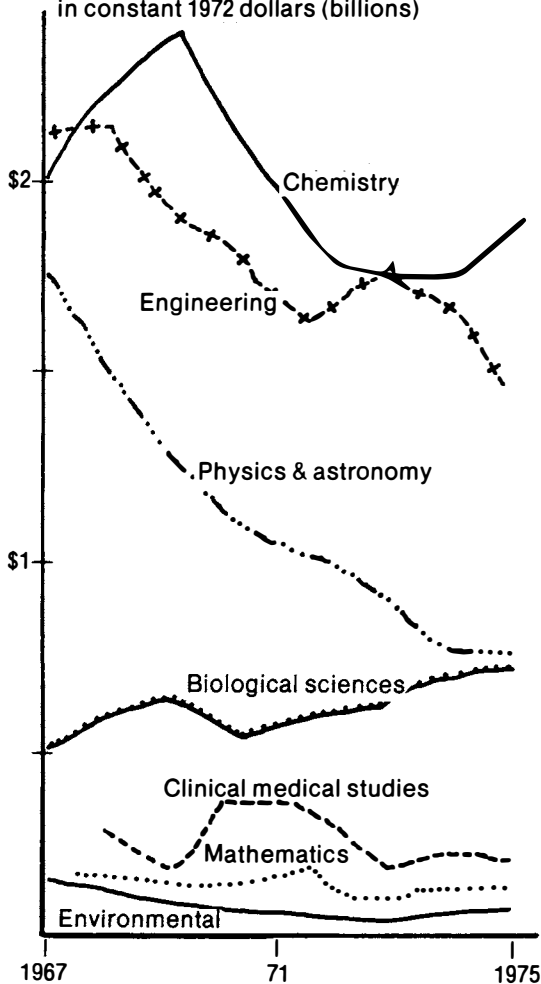
By 1963 this thrust had died down, and the percentage of students going on for advanced degrees in science began a period of gradual decline, which continues today. It was also at about this time that Scholastic Aptitude Test scores began their steady fall (see Graphs X and XI). By 1965 the nation's research and development expenditures had reached their peak, and also began to sink. Although agencies like the Department of Defense and the National Aeronautics and Space Administration were still getting extensive funding, the era of scientific recruiting has ended, transformed into the antitechnology Peace Corps and VISTA perspective of "post-industrialism." As municipalities and states confronted ever more

X. The decline in Scholastic Aptitude Test (SAT) scores
(mean scores, all students)



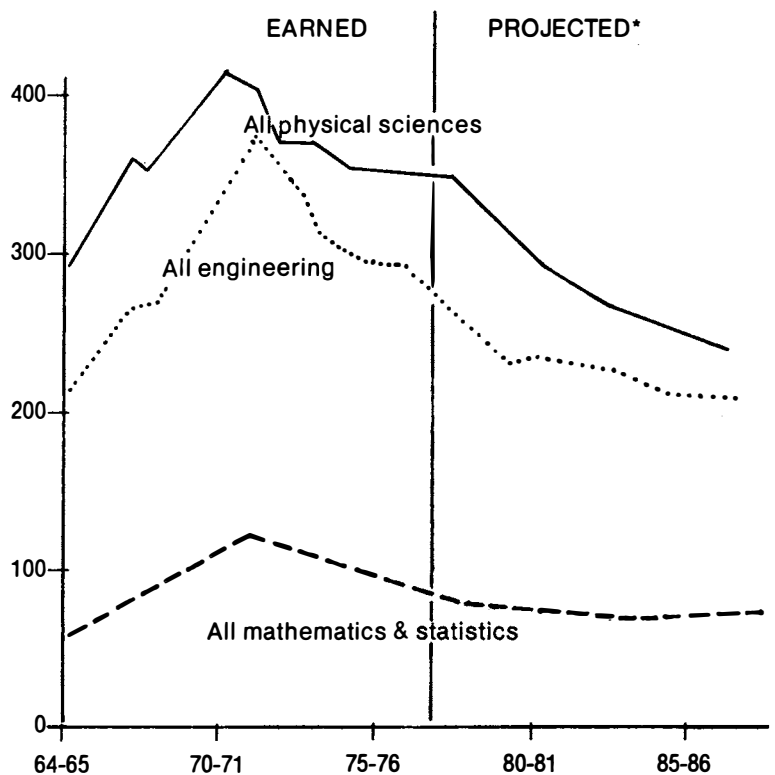
VIII. Expenditures for basic research in industry, 1967-1974

in constant 1972 dollars (billions)



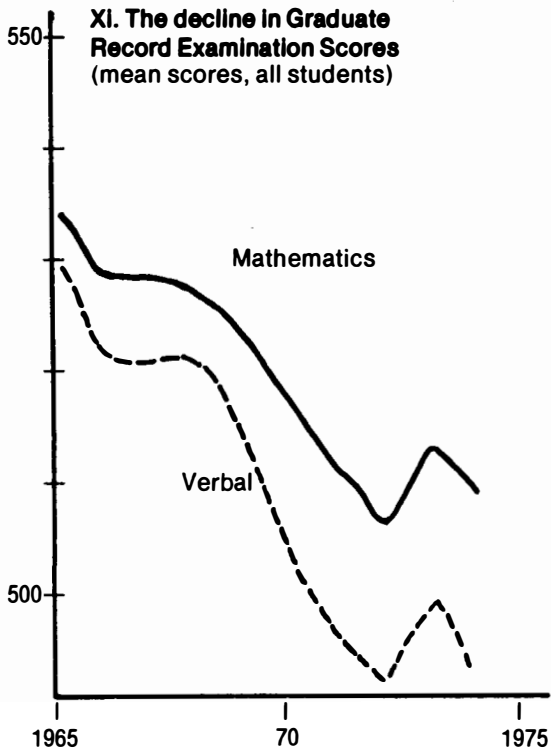
Source: National Science Foundation, NSF-77.

IX. Earned & projected PhDs, 1964-65 to 1985-86



Source: National Science Foundation

*Projections based on current enrollment



desperate financial problems, educational cheap shots like “work experience,” “detracking,” and “alternative education” became more popular. By the end of the 1960s research and development budgets were being cut to the bone, and whole chunks of aerospace — including thousands and thousands of scientists, skilled workers, and engineers — were being thrown on the scrap heap.

America's Responsibility

According to the Executive Director of the United Nations' Children's Fund, there are more school-age children in the world's developing countries out of school than in. If this trend continues, fewer than 30 percent of children between six and 11 years old will be in school by 1985.

The U.S., as the world's first scientific and technological power, should be leading the rest of the world into a 21st century of universal progress. How will those millions be taught the fundamentals they will need for economic development, if the United States' own population is largely illiterate?

Already, even the most ambitious development schemes for the Third World must take into account long lag times before improvements in educational skills and, consequently, productivity become apparent. Conversely, the effects of the deterioration of U.S. education and science have only begun to be felt. Can we afford to let the problem get any worse?

—Carol Cleary