Technical Illiteracy Threatens U.S. Science

The nation's commitment to excellence and international primacy in science, mathematics and technology has waned markedly over the past 15 years. A new report criticizing science and math education in the United States predicts that not only the science community, but also the nation as a whole, will suffer if drastic changes aren't made quickly. And, the report says, since schools reflect the nation's commitment in any area, "they therefore are not so much a cause of this condition as a result."

Last February, President Jimmy Carter circulated a memo inquiring how adequately science and engineering education was preparing students to tackle the nation's anticipated problems. "Science and Engineering Education for the 1980s and Beyond" is the 240-page answer drafted by the National Science Foundation and the Education Department. And it highlights two important problems: First, that any technical lead the nation may exhibit, relative to the rest of the world, is in jeopardy; second, that "the current trend toward virtual scientific and technological illiteracy, unless reversed, means that important national decisions involving science and technology will be made increasingly on the basis of ignorance and misunderstanding."

Science and technical literacy is becoming increasingly necessary in our society. Yet the report notes that "more students than ever before are dropping out of science and mathematics courses after the tenth grade" and adds that "this trend shows no signs of abating." In fact, there is "a growing discrepancy between science, mathematics, and technology education acquired by high school graduates who plan to follow scientific and engineering careers and those who do not."

Only 17 percent of all high school students take 11th or 12th grade science and math. They tend to be individuals planning careers in science, engineering or medicine. While these students continue to receive an adequate education, the nationwide trend toward reducing graduation requirements in science leaves many of the rest technically illiterate.

This growing illiteracy is credited in part to the current focus by many schools on stressing only "basic skills." Science education is not generally regarded as a basic need, the report says, and the only basic component of mathematics sure to be emphasized is arithmetic.

A teacher shortage exacerbates this problem. Nationally, the shortage of qualified mathematics teachers at the high school level has reached about 10 percent. A similar though less severe shortage plagues physical-science departments. Unfortunately, the report says, "vacancies" in these departments do not go unfilled. Instead, teachers "with only marginal capability in these teaching areas" assume the posts. And "as might be expected, the quality of instruction frequently declines."

A teacher shortage also haunts many university computer-science and engineering departments. Faculty and potential graduate students are being lured into lucrative industry research-and-development programs at a time when demand for undergraduate teachers in these areas is escalating. "The net effect has been a reduction in the ability of universities to provide education in engineering and the computer professions."

Making this situation doubly problematic are current spot shortages of engineers, particularly in the computer field. With teacher shortages at the university level already beginning to limit how many students can train for these fields and hampering the quality of education in these departments, this professional shortage will not be overcome easily.

Nonetheless, the report does recommend actions for tackling this and related problems. Not surprisingly, proposed remedies stress options open to federal agencies. Among prescriptions that could benefit from NSF or Education Department funding are revised elementary-school and high-school curricula that emphasize: technical careers that do not require college degrees; opportunities for women, minorities and the handicapped; the vocational relevance of science, math and engineering in nonscientific fields; and an appreciation for society's growing reliance on technology, especially computers.

Suggestions for curbing faculty erosion in engineering include: offering more competitive salaries, replacing obsolete laboratory equipment and increasing funds for academic research. The report also suggests that schools consider adopting the "medical school model" — that is, permitting faculty more freedom to augment their salaries outside the university.

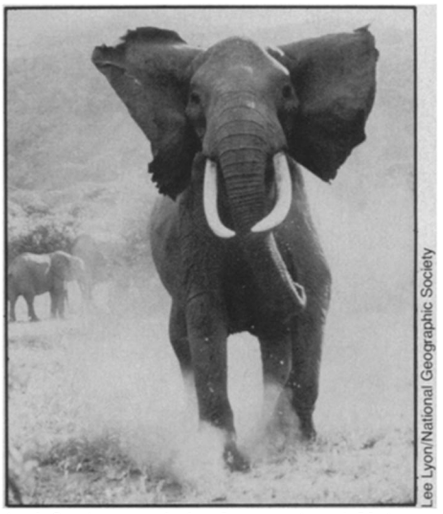
Finally, to stem the personnel shortages in certain technical disciplines, the report challenges federal agencies to devise incentives for pulling students into fields where the greatest shortages are anticipated — computer science, solid-state physics and chemical engineering. □

Elephant census: A final countdown?

Forty million years ago Paleomastadon (ancestor of today's elephant) began its long march — from Africa through Asia, Europe and North and South America. Now that march may be coming to an end. A recently completed three-year census finds only about 1.3 million elephants surviving in Africa. There are no previous figures with which to compare this, but the survey, conducted by Iain Douglas-Hamilton and Oria Douglas-Hamilton, suggests that African elephants are being killed faster than they can reproduce. Oria Douglas-Hamilton pleaded the case of the elephants this week in Washington at the headquarters of the National Geographic Society.

Ivory poaching accounts for most of the 50,000 to 150,000 elephants killed in Africa each year. The 1,500 percent increase in the price of ivory over the past decade encouraged the massacre of elephants by a variety of means — poison arrows, camouflaged pits, horsemen's spears, fruit poisoned with battery acid or insecticide, high-powered rifles and automatic weapons. Idi Amin's retreating troops, for instance, gunned down scores of elephants and other animals in Uganda.

Despite the discouraging numbers, the World Wildlife Fund, the New York Zoological Society and the International Union for Conservation of Nature — sponsors of the elephant census — feel that steps can be taken to save the elephant. The WWF, for instance, recently launched a campaign to raise $1.1 million for an African Elephant Action Plan that would set up:



- a conservation program for protection of elephants and habitat (loss of habitat to humans is the long-term threat),
- an economic program that would focus on control of the ivory trade,
- an education program to encourage public awareness of the environment and
- a research program that would monitor elephant population trends. □