Education for Development

While support of science education is slipping in the United States, in developing countries, it's still going strong

by John H. Douglas

Two weeks ago, SCIENCE NEWS *examined the status of science education in the United States. In this article John H. Douglas takes a look at a program for science education in the less developed countries.*

While many industrialized societies are growing more skeptical of the scientific endeavor and enrollment in science courses is dwindling in several Western countries, most Third World nations still look to technology as the door to development and economic equality, and they see science education as the key to technology.

But many barriers still block the application of education to development; where most citizens cannot read simple directions on household gadgets, preparation of a technically trained elite usually takes a low priority. And even where higher education is available, the training of graduates in a particular discipline often does not match the need for expertise in practical situations. This is the dual challenge for planners of international science education.

The image of an immigrant ghetto mother bragging to the neighbors about "my son the doctor" has become a standard joke in the American repertory, but in most parts of the world, self-sacrifice for the sake of educating one's children is still a serious, lifetime business. A son or daughter who becomes a doctor, or engineer, or even a clerk, can mean the difference between poverty or security in the parents' old age, as well as added status for the family. The children too must often approach schooling with a burdensome seriousness that would disturb most American parents, for they know that even before they reach adolescence they must pass a series of exams that will determine their lifetime careers. Usually the brightest are selected for scientific training.

For developing nations, education—particularly advanced technological education—is a two-edged sword. One edge may cut away the barriers to development, but the other may slice away at centuries-old traditions and power structures. A new, independent class of educated elite is formed, which may alternately threaten a country with loss of its best minds through a "brain drain," or cause collapse of an entrenched power structure and the social equilibrium that supports it. Little wonder teachers are often the first to be shot during a revolution!

Fortunately, most countries have come to view the dangers of education as being less ominous then those of sustained ignorance, and have moved toward the fuller international cooperation that is a necessary part of building a national education system. From industrial nations come professors and technical experts to help train an indigenous cadre of teachers, and from surrounding nations of a region can come vital support in facing mutual problems. To help coordinate these efforts, the United Nations Education, Scientific and Cultural Organization (UNESCO) has launched an ambitious program of international and regional cooperation, especially in scientific and technical education. SCIENCE NEWS recently talked with Sidney Passman, director of the Division of Scientific Research and Higher Education, and Ingmar Eneberg, a project specialist with the division, at UNESCO headquarters in Paris.

The principal thrust of the current program, according to Passman, is to help adoption of "appropriate education" in less developed countries (LDS), thus overcoming some of the problems of mismatched skill and needs that have plagued the educational programs of so many LDC's. He sites the example of Equador, which at present has too many civil engineers and has started training even more new engineers—perhaps overoptimistically—to help with an anticipated oil boom. By helping such nations plan ahead for their future manpower needs and work out with their neighbors some cooperative educational ventures, UNESCO hopes to prevent formation of these serious manpower shortages and surpluses.

The trick, of course, is how to get regional cooperation when often a nation's bitterest enemies are its neighbors. Eneberg emphasizes the need to provide a "critical mass" of trained manpower in order to solve complex problems. Most LDC's simply do not have enough resources to achieve such a critical mass on their own, but by pooling talent with surrounding nations in a research and educational "network," a first-rate problem solving capability can be established. UNESCO helps foster such cooperative ventures by sponsoring ministerial meetings to elicit support at the highest level, followed by lower-level conferences to work out the particulars.

One such network, now being considered by UNESCO, was proposed at a meeting of ministers of African nations. According to this plan, various existing engineering schools would be selected as regional centers, specializing in particular technological fields to serve the needs of the region. Examples cited in the report include schools for mining in Lusaka or Zaire, mechanical engineering in Nairobi, civil and mechanical engineering in Nigeria and electronics in Abidjan. The centers would train students to the doctoral level, perform applied research related to regional needs, and help in the development and adoption of "appropriate technology."

In general, UNESCO wants to stay out of the education business directly; one exception is the International Centre of Theoretical Physics at Trieste. Here physicists from LDC's come as fellows for periods ranging from three weeks to a year, learning about the latest techniques and advances in their field. The hope is that access to such an institute will help counter the tendency of such very specialized scientists to leave their country of origin. By keeping in touch with other scientists scattered throughout a region, participants help establish what one UNESCO official called "the invisible college"—a broad, continuing transfer of knowledge catalyzed by the Trieste center. A similar center for applied mathematics is being planned.

UNESCO also helps plan and sponsor interdisciplinary regional research projects and conducts studies to determine future technical needs of a region. Environmental education is taking high priority at the moment, with help from American educators who believe the study of environmental problems can be used as a natural springboard for

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Off the Beat

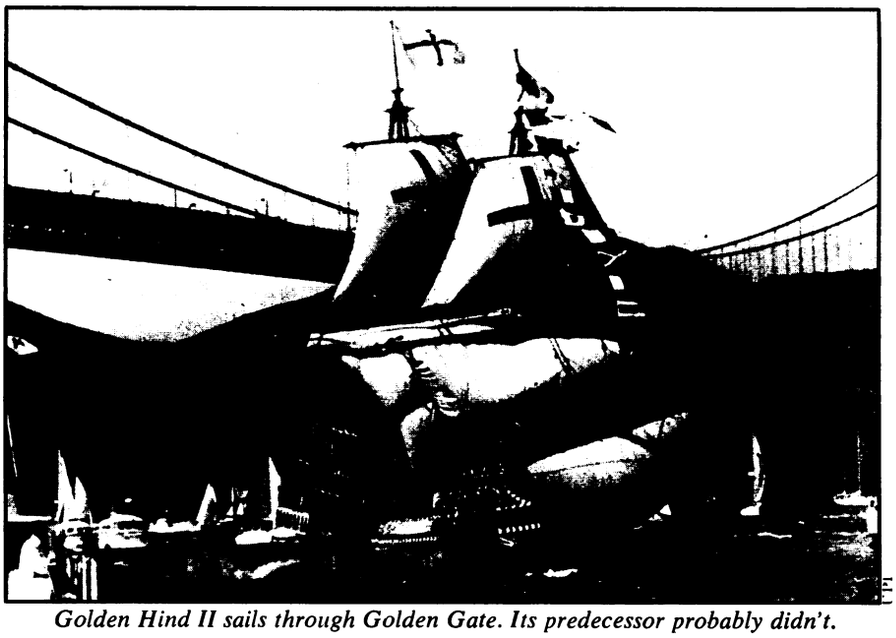
Drake and the bay: Facts or legends

The recent ceremonial entry of a replica of Sir Francis Drake's famous vessel, the *Golden Hind*, into San Francisco Bay, where it will be anchored as a tourist attraction, brings to the fore once-again the oft-aired controversy over whether Drake could have discovered the bay in the summer of 1579 during his epochal circumnavigation of the earth.

The dispute has produced more than its share of heat and emotion over the years and would not be worth mentioning again were it not for availability of a recent and valuable contribution to the subject by that eminent (and eminently readable) historian of the seas, Samuel Eliot Morison. Morison, twice winner of the Pulitzer Prize for his works on Columbus and John Paul Jones and an octogenarian Harvard emeritus professor, combines impeccable credentials as a scholar and a salty no-nonsense writing style with an insatiable curiosity to follow the routes of the maritime explorers himself. The result is a series of fascinating and authoritative chronicles of early exploration.

His latest work, *The European Discovery of America: The Southern Voyages* (Oxford, 1974), completes his two-volume set on the European discovery of the New World begun with publication of *The Northern Voyages* in 1971. In researching the chapter in *The Southern Voyages* on Drake in California, Morison in May 1973 sailed along the California coast to compare descriptions in the three contemporary accounts of Drake's voyage with his own observations.

He concludes, with the majority of scholars and against a vocal minority, that the bay where Drake spent the five weeks from June 17 until July 23, 1579, careening and repairing the leaky *Golden Hind* was not San Francisco Bay and not Bodega Bay but indeed what is now called Drake's Bay, 36 miles north of the Golden Gate, just south of Point Reyes.



Golden Hind II sails through Golden Gate. Its predecessor probably didn't.

Morison considers all five lines of data available from the contemporary accounts, including the latitude, 38 degrees N., exactly that of Point Reyes. The determining factor leading to his conclusion that Drake's Bay is the correct site are the conspicuous white cliffs, the highest along the coast, closely resembling, Morison notes, those on the English Channel. This closely fits Drake's description of "white bancks and cliffes, which lie toward the sea," and which reminded Drake of England's south coast and moved him to name the area Nova Albion, after the Greek name for England.

That Drake could have passed along the coast without seeing the Golden Gate, is something, Morison notes, that "no mariner who knows the California coast will find . . . surprising." The lay of the land is such that the hills of Oakland and Berkeley blend with those in the foreground to appear as one continuous mass. Fog frequently obscures the entrance. The next important voyage after Drake missed it, and "the annual Manila galleons returning to Acapulco passed along this coast, within sight of the shore, for two hundred years, without ever seeing the Golden Gate." Morison recounts the long history up to modern times of vessels missing it. "Almost any seaman with experience of this coast will think it preposterous that Drake could have seen this entrance. And that Drake could have entered this gorgeous bay, one of the world's finest, without describing it, is incredible." San Francisco Bay was finally discovered by a Spanish overland expedition in 1769.

What then of the famous "Plate of Brass," discovered in the 1930's on a hill overlooking the bay and bearing an inscription like that known to have been left by Drake at the site of his five-week stay? It is now prominently displayed near the entrance to the Bancroft Library, Berkeley. Nonsense! snorts Morison. He agrees with a long line of experts that it's a fraud. He recounts the evidence to that effect, including metallurgical analysis and verification that its lettering and language are not of the Elizabethan period. He describes additional, unpublished, notes and correspondence of scholars furnished Morison by the Huntington Library that further debunk the find.

"In my opinion," concludes Morison, "the plate is a hoax perpetrated by some collegiate joker who knew little about Drake except what he had heard . . . and read. . . . 'Drake's Plate of Brass' is as successful a hoax as the Piltdown Man or the Kensington Rune Stone."

—Kendrick Frazier

. . . Science Education

science education more generally. By anticipating technologies to come, educators can better plan what subjects should be taught now, and the results of a UNESCO study of technological priorities in Africa produced some surprising new ideas. African experts, for example, feel that the helium-filled airship offers great promise in hauling heavy loads to inaccessible portions of their vast continent. Other feasible new technologies for which planning and education should already begin include satellite telecommunications, solar energy, use of native herbs for pharmaceuticals and applied genetics for crop augmentation. To help facilitate the educational process, the experts called for increased use of mass media for education in the home.

Just as an educated elite can either help or hurt the government of a developing country, creation of technical expertise throughout the developing world can both challenge and aid the technological position of Western countries —depending on whether both sides choose to adapt and cooperate. The hope is that a well-coordinated program of science education involving international and regional cooperation will help assure future cooperation. □