

# Science for the have-nots

Developed and developing nations can build better partnerships.

## Ahmed H. Zewail

Only a fifth of the population enjoys the benefit of life in the 'developed world', and the gap between the haves and have-nots continues to increase, threatening stability. According to the World Bank, of the 6 billion people on Earth, 4.8 billion live in developing countries, 3 billion live on less than US\$2 a day, and 1.2 billion live on less than \$1 a day, which defines the absolute poverty standard; 1.5 billion people do not have access to clean water.

Although globalization, in principle, aspires to help nations prosper and advance, it is better tailored to the fraction of the world's population able to exploit natural resources and markets. The per capita gross domestic product — the total unduplicated output of economic goods and services produced within a country as measured in monetary terms — has reached \$35,000 in some Western countries compared with about \$1,000 in many developing countries, and significantly less in underdeveloped populations. For example, according to United Nations statistics: Angola \$528; China \$777; North Korea \$430; South Korea \$6,956; United States \$31,059; and Yemen \$354. This situation will, if left unchecked, exacerbate global instability.

## Progress barriers

Developing nations encounter four barriers to achieving developed-world status. High rates of illiteracy in many developing countries reflect the failure of educational systems, and are linked to the alarming increase in unemployment. Second, the limited use of human resources — largely due to hierarchical dominance, strong seniority systems and the centralization of power — suppresses collective human thought and stifles human potential. Third, the mix-up of state laws and religious beliefs causes confusion and chaos through the misuse of religion's fundamental message about the ethical, moral and human ingredients of life. And fourth, there is an incoherent vision for science and technology.

The lack of a solid science and technology base is not always a result of poor capital or human resources. It sometimes stems from a lack of appreciation of the critical role of science and technology in development, an incoherent methodology for establishing such a base, and an absence of a coherent policy addressing national needs, and human and capital resources. Some countries consider scientific progress to be a luxury, in view of other demanding problems. Others believe that the base can be built by buying technology from developed countries. These beliefs

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translate into poor or, at most, modest advances that are based on the efforts of individuals, not institutional teamwork.

These issues point to three essential ingredients for progress. First is the building of human resources by eliminating illiteracy, ensuring active participation of women in society, and reforming education. Second is to rethink national constitutions, allowing for freedom of thought, minimizing bureaucracy, developing a merit system, and creating a credible — and enforceable — legal code. Third is the building of a science base.

The foundations of a science base are investment in special education for the gifted, the establishment of centres of excellence, and the chance to apply knowledge in the industrial and economic markets of the country and, eventually, the world. This must go hand-in-hand with a plan for general education at state schools and universities. With such a vision, a scientific culture will emerge that enhances a country's ability to follow and discuss complex problems, rationally and collectively. Scientific thinking becomes essential to the fabric of the society.

Many people feel that a scientific culture is only for developed countries. Some even believe in conspiracy theories — that the developed world will not help developing countries so as to control the flow of knowledge. I do not subscribe to such theories. The recent examples set by China and India, among others, of success in the world market result from their developed educational systems and technological skills in certain sectors. What is needed to develop a scientific culture successfully is acceptance of responsibility in a collaboration between developing and developed countries.

Developing countries need centres of excellence, not only for research and development, but also for training experts in advancing technologies and so reducing the brain drain experienced by many such countries. It is important that these centres are not just exercises in public relations: they should be limited to a few areas in order to build confidence and recognition.

To this end, national resources are needed to support research and development in a selective way, following well-established criteria based on merit and distinction. To guide national policy, government at the highest level should create an overseeing board for science and technology, formed from national and international experts. Without serious commitment to these principles, progress will remain limited.

## Basis for success

Some developing countries have made admirable progress in these areas: and the development of India, South Korea and Taiwan reflect this. In Egypt, the University of Science and Technology is involved in an experiment being carried out on a 300-acre site given by the government on the outskirts of Cairo. The university awaits the approval of a new law that will make it a non-profit, non-government organization.

But it is also the responsibility of developed countries to focus aid programmes. Usually an aid package is distributed between many projects, with lack of follow-up leading to diffusion of resources and in some cases corruption, so the aid does not result in significant successes. Real focus can be achieved by establishing what I call 'partnership-guided aid', with a significant fraction of the aid being directed towards excellence using criteria established in developed countries.

There must also be a minimization of politics in aid. The use of an aid programme to help specific regimes or groups is a big mistake, as history has shown that it is in the best interests of the developed world to help the entire populations of developing countries. The aid programme should be visionary in its mission and supportive of investment in future developments. Developed nations either can give money as charity or they can become partners, providing expertise and a follow-up plan.

Some developed countries are recognizing the importance of partnership, especially with their neighbours. Examples include the United States and Mexico, and western and eastern Europe. Real success can be achieved provided there exists a sincere commitment to a partnership. This is in the best interests of both the developed and developing countries for peaceful coexistence in a world of civilized humanity. ■

Ahmed H. Zewail is in the Divisions of Chemistry and Chemical Engineering; and Physics, Mathematics and Astronomy, California Institute of Technology, Pasadena, California 91125, USA. This commentary is based on his address to the Pontifical Academy of Sciences at the Vatican.