and making it part of the structure of tertiary education. Examples include the United Kingdom and France, which are quite advanced in the development of procedures to recognize and accredit work-based learning; Germany, which has numerous special university provisions for senior citizens; Greece, which has established an open university; and Sweden and Norway, which tend to rely on their established quota systems for older students. Despite continuing skepticism among academic teachers, the issue of lifelong learning has become part of the ongoing reform agenda in Europe, part of efforts universities are undertaking to improve their interaction and cooperation with their environment and with a wider range of external stakeholders. ■

Should Universities in Developing Countries Stop Doing R&D?

Armando Alcantara

Armando Alcantara is professor at the Center for University Studies, Universidad Nacional Autonoma de Mexico. He is a visiting scholar in the Center for International Higher Eduation at Boston College during the 2000–2001 academic year. Address: CIHE, Campion Hall, Boston College, Chestnut Hill, MA 02467 USA. E-mail: <armando.alcantara@bc.edu>.

As we witness the transformation of many developed nations into knowledge-based societies, the difficulties for developing countries trying to catch up seem insurmountable. Research universities—along with other public- and private-sector institutions in the industrialized world—continue to develop technology products at unprecedented pace. At present, the world is thus observing how the gulf between developed and developing countries keeps widening. While industrialized nations such as the United States, Japan, and the countries in Western Europe invest between 2 and 3 percent of their GDP in research and development (R&D), the countries of the developing world rarely reach 1 percent on the same indicator. The close link between industry and university R&D in the developed world makes scientific and technological research an important tool for economic development. More often than not, however, university R&D in developing nations lacks effective demand from local industry, making it basically academia oriented. This situation is especially disturbing when university research does not contribute significantly to the solution of urgent local societal needs.

Some countries of the Third World are trying to replicate the successful experiences of Korea, Taiwan, Singapore, and Malaysia, countries that have proven that it is possible to achieve economic growth based on the contributions of local R&D. It has not been possible thus far to achieve successful results because the coordination of government, universities, and local industry in a clear innovative strategy has not occurred. As a consequence, the viability of developing countries' R&D is an issue of growing concern among scholars, scientists, and policymakers.

Latin America and, more particularly, Argentina and Mexico, are cases that illustrate the current situation of R&D within the developing world. The knowledge produced in Latin America represents less than 3 percent of the world's scientific production. This is not surprising given its low investment in R&D. Public expenditures in R&D of all Latin American countries are equivalent to the expenses in R&D of merely a couple of multinational corporations. In Argentina and Mexico–the countries in the region that (along with Brazil) have a tradition of and personnel in R&D—R&D investments have remained significantly low (less than 0.5 percent of GDP). The number of scientists and engineers in R&D is also low (between 14,000 and 16,500), while in the industrialized countries it reaches figures above 50,000. Other indicators show that most R&D funds in Argentina and Mexico come from public money (more than 80 percent). There are very few graduates at the doctoral level training for careers in research. Consequently, with very limited resources and small R&D communities, the output is irrelevant when measured by the number of patents granted to residents and nonresidents. In relation to this indicator, royalties and license fees payments are much higher than receipts.

It remains to be seen whether the current globalization process and the growing availability of technology communication and information constitute a real chance to overcome the lack of relevance that local R&D has had so far in the developing world.

It is also worth mentioning that R&D in Argentina and Mexico occurs at the large, publicly funded universities. Argentina's University of Buenos Aires (UBA) and Mexico's National Autonomous University (UNAM) are, along with Brazil's University of Sao Paulo and University of Campinas, among the most prestigious institutions for scientific research in Latin America. Despite having the oldest research tradition and employing the largest number of scientists (many of whom are highly distinguished), UBA and UNAM are also too large, with enrollments near and above 200,000 students, respectively, and are plagued by tight budgets, excessive bureaucracy, overpolitization, weak

links with local industry, and so on. As is the case with most Latin American institutions of higher education, UBA and UNAM share a strong professional orientation that can be observed in their schools of engineering, medicine, law, accounting, and philosophy and letters. In most of these schools R&D constitutes only a marginal activity.

With all the enormous problems exemplified by these universities and the marginal role that local R&D plays in addressing societal needs, the question arises over whether universities in developing countries should stop doing R&D. There is, of course, no easy answer to this dilemma, since the creation and diffusion of knowledge remain among the principal missions of the modern university. Likewise, some of the large, public institutions possess important research facilities and equipment that have been accumulated over decades. Several universities also employ significant numbers of scientists and technicians whose training (frequently obtained at prestigious universities in industrialized nations) represent a significant investment in money and time. All these resources must not be wasted. Two approaches exist to make local R&D more relevant. First, local R&D should be focused on the creation and consolidation of "niches," in which a number of scientists and technologists concentrate on specific areas and become highly competitive in those fields. Second, R&D efforts should also be directed to the solution of the most urgent needs of the local society—such as health, energy, food, education and pollution.

It remains to be seen whether the current globalization process and the growing availability of technology communication and information constitute a real chance to overcome the lack of relevance that local R&D has had so far in the developing world. It is possible that the existing gap between the industrialized and the developing nations will widen as a result of technology. The risks of losing track in the present vertiginous knowledge race is more real than ever, as information goes back and forth from one point to the other in the world at unprecedented speed. Thus researchers and technologists in developing countries must take advantage of communications networks to maintain and improve the exchanges with the world's prime places of R&D, thus avoiding the perils of moving from marginalization to exclusion. ■

Attitudes About International Education in the United States

David Engberg

David Engberg is a program associate at the American Council on Education, Center for Institutional and International Initiatives. Address: One Dupont Circle, NW, Suite 800, Washington, DC 220036. E-mail: <david_engberg@ace.nche.edu>.

Dramatic geopolitical shifts and technological expansion during the last century have prompted much discussion about the role of higher education in preparing a more globally literate national citizenry. But to what end? Today, evidence suggests that few postsecondary graduates have adequate understanding of the world beyond U.S. borders, speak another language with any degree of fluency, or can function competently in different cultures.

To better understand and promote international education in the United States, the American Council on Education (ACE), the umbrella organization for over 1,800 colleges and universities and nearly 200 national and regional higher education associations and organizations, has launched a multiyear initiative aimed at mapping current international activity and stimulating campus dialogue about what constitutes effective international education. Documents recently published by the ACE provide some introductory insights into international activity nationwide as well as public perception of its importance.

Public Opinion on International Education

Despite at times conflicting accounts from the media and various political authorities, a popular consensus seems to exist that international education at the postsecondary level is important. In a random telephone survey of 1,000 Americans over the age of 18 conducted for the ACE in September 2000, respondents indicated that international education was an important personal and national concern.

- Knowledge about international issues is important, especially for future generations. Over 50 percent of respondents believed it was important personally; almost 90 percent considered it important for their children or young people today.
- Colleges and universities should require international training for students and provide them with international skills and knowledge. Over 70 percent of the sample said students should be required to study a foreign language in college if they did not already know one. More than three out of four supported requiring students to take international courses.
- College and university students should have an international experience as part of their overall education. Over 70 percent of the respondents agreed that students should have a study, work, or internship experience abroad sometime during their postsecondary studies.
- More than 75 percent of those asked specified that international education opportunities would be an important consideration in selecting a college or university.

A companion survey of 500 high school seniors intending to enroll at a four-year college or university produced similar findings, confirming a broad national base of support for international education. Conducted by the ACE and the Arts & Science Group, Inc./*studentPOLL*, the random national poll found that:

- Incoming freshmen believe it is important that colleges and universities offer international experiences and opportu-