NSF Grants $5.6 M to Support Basic Research in Educational Technology

The National Science Foundation (NSF) awarded 25 grants that total more than $5.6 million in planning and research to universities, nonprofit institutions, and one California high school to carry out basic research under its Collaborative Research in Learning Technologies (CRLT) program. The 25 individual awards range from $37,909 to $880,658.

CRLT will stimulate research on the integration of technology with learning at all levels of education. "This research will enable the development of new educational systems of self-directed and life-long learning," said NSF Acting Deputy Director Joseph Bordogna. Rather than produce products that can be immediately introduced into the marketplace, CRLT is expected to build a knowledge base over several years.

Although computers and other technologies have, in recent years, become more prominent in classroom teaching, the use of technology has not become commonplace in most classrooms as it has in the majority of workplaces. While the commercial software industry has developed a number of successful educational applications, CRLT's primary objective is to promote the development of products that would not necessarily be immediately commercially viable.

The projects are designed by multidisciplinary teams and will employ state-of-the-art tools such as artificial intelligence and cutting edge telecommunications technologies. Although the programs are designed to improve the quality of technological tools for life-long learning, some are specifically designed to improve math and science education for traditionally underserved groups.

CRLT is a joint undertaking of four of NSF's directorates: Computer and Information Sciences and Engineering, Education and Human Resources, Engineering, and Mathematical and Physical Sciences.

The recipients of the CRLT program awards are Arizona State University; Auburn University; Bell High School, Los Angeles; Boston University; Education Development Center, Inc, of Newton, Massachusetts; The Exploratorium, San Francisco; George Mason University; Georgia State University; Georgia Institute of Technology; Maricopa Community College, Arizona; Massachusetts Institute of Technology; Northwestern University; Oregon Graduate Institute; SRI International (three awards); Stanford University; TERC, Inc., of Cambridge, Massachusetts; Texas A&M; University of California at Los Angeles; University of Colorado; University of Illinois; University of Massachusetts at Amherst; University of Southern California; and the University of Washington.

Open Trade Policy for High-Tech Industry Promotes Technological Progress

More and more countries are turning to restrictive trade measures and subsidies to develop the high-technology industries they believe will provide faster economic growth, higher wages, and greater national autonomy. In the recent past, international trade disputes have erupted over semiconductors, large commercial aircraft, and other technology-intensive products, in part because established producers believed foreign governments were unfairly supporting their competitors.

According to a report, *Conflict and Cooperation in National Competition for High-Technology Trade*, by a steering committee of international experts, sponsored jointly by the National Research Council, the Institute for Economic Research in Hamburg, and the Institute of World Economics in Kiel, unless sustained efforts are made to open high-tech markets and encourage balanced cooperation, trade conflicts like the 1980s disputes on semiconductors and Airbus will occur again. Renewed conflict may be fueled by the rapid entry of newly industrializing countries into the high-stakes, high-tech global marketplace. These disputes could significantly damage not only the multilateral trading system but also the tradition of international cooperation on scientific research and the prospects for collaborating in the development of new technologies.

The committee outlined principles and rules that governments should adopt to avoid trade conflicts and foster a healthy global economy. It proposed a mechanism to reduce discrimination against foreign suppliers in government procurement, called for governments to drop the trade exemption on research and development subsidies, and urged removal of restrictions on telecommunications investment and services to encourage the growth of a global information system.

The steering committee's findings and recommendations reflect a consensus among experts from Japan, Canada, Germany, Switzerland, the Netherlands, and the United States on a series of high-profile issues. The committee strongly endorsed a government role in funding research and development, including support for public-private consortia.

Government purchases of high-tech products such as power-generating equipment, telecommunications systems and components, high-speed computers, medical equipment, and civil aircraft make up a significant share of the global market. For this reason, discrimination against foreign bidders on government contracts should be reduced. One mechanism for doing this would be to ensure that limits are placed on the degree to which governments may favor domestic suppliers. Governments would be limited to allowing domestic suppliers a price advantage that would be made public, capped, and—like tariffs—progressively reduced through international negotiations.

While recognizing that nations will compete in the high-technology arena, the report underscores the incentives spurring international cooperation among both private corporations and national technology programs. These incentives include the need to share dramatically rising capital costs, to benefit from technical expertise dispersed around the globe, and to set common standards for high-tech products.

Other major recommendations to encourage cooperation include the following:

- Because foreign direct investment is a major channel for technology and trade flow between nations, a multilateral investment accord should be completed promptly.
- Compulsory technology transfers should be prohibited.
- Governments should work to eliminate all tariffs in high-technology sectors by the year 2000 or sooner.
- International efforts should be encouraged to protect intellectual property rights and to establish them for new fields such as global information systems and biotechnology.
- A sustained effort is needed by governments to develop common principles and practical guidelines concerning antitrust policies.

The study was funded by the German-American Academic Council, AT&T Corp., General Electric Co., Hitachi Ltd., MEMC Electronic Materials Inc., Northern Telecom Ltd., Philips Electronics N.V., Samsung Electronics Co. Ltd., Siemens Corp., Trimble Navigation, and Varian Associates Inc.

Copies of the report are available from the National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418; 202-334-3313 or 1-800-624-6242. The cost of the report is $39.00 (prepaid) plus shipping charges of $4.00 for the first copy and $.50 for each additional copy. □