

FOREWORD

The Division of Science Resources Studies (SRS) supported the workshop on “Graduate Education Reform in Europe, Asia, and the Americas and International Mobility of Scientists and Engineers,” held at the National Science Foundation (NSF) November 17-18, 1998. The objective of this workshop was to provide NSF, SRS, and the National Science Board with analyses of recent changes in graduate science and engineering education and international mobility of scientists and engineers among these regions.

The information generated by this effort is intended to assist NSF in its continuing efforts to promote the education of scientists and engineers in a changing global environment. Recent changes in that environment have included the reported expansion of graduate S&E programs abroad, as well as changes in patterns of international mobility of scientists and

engineers. An understanding of the nature and magnitude of these changes is needed to inform program and policy deliberations and assist in planning NSF graduate education initiatives.

The information presented here complements and augments the international coverage in the *Science and Engineering Indicators* report (Chapter on Higher Education in Science and Engineering) of the National Science Board.

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AUTHOR'S ACKNOWLEDGMENTS

This workshop was made possible by the contributions of a dozen international experts who agreed to prepare country papers under tight time constraints covering the main workshop topics: expansion of graduate capacity, educational reforms, the role of government and industry in supporting and employing S&E graduates, and the patterns of international mobility of scientists and engineers. Among the experts who agreed to prepare papers and attend the workshop were Peter Maassen, Director of the Center for Higher Education Policy Studies (CHEPS) in The Netherlands; his research associate Jeroen Bartelse, who has recently completed his dissertation research on institutional reform in European higher education; Dominique Martin Rovet, author of mobility studies on French scientists and head of the Washington liaison office of the French national research system; Shinichi Yamamoto, Director of the Research Center for University Studies in Tsukuba, Japan; Yugui Guo, who has recently completed his dissertation on graduate education in China; Atul Wad, president of a technology-transfer firm; Jacqueline Leta, of the Biomedical Sciences Institute of the Federal University of Rio de Janeiro; Hebe Vessuri, of the Venezuelan Institute of Scientific Investigations; Manuel Mari, of the Institute of Social Studies of Science and Technology in Argentina; and Sergio Marshall, graduate dean of the Catholic University of Valparaiso and head of the Council of Rectors of Chilean universities. Mario Albornoz, head of the Institute of Social Studies of Science and Technology was the lead author of the country paper on Argentina, but was unable to attend the workshop. Similarly Beatriz Santana, of the Latin American Studies Center of the University of Los Angeles headed the team that prepared the Brazilian paper, but was unable to attend the workshop.

Through a contract with Stanford Research Institute (SRI), H. Robert Coward assisted SRS in preparations and follow-up for this workshop, including locating some country experts, reviewing several authors' drafts and suggesting changes, and providing international travel, per diem and honoraria for all international attendees. In addition, Dr. Coward participated in the workshop, prepared the highlights of discussion which appear in the summary of proceedings, and assisted SRS in iterating with sev-

eral authors on the edits of their papers. Alan I. Rapoport, Senior Analyst in SRS, and I read the edits of several country papers and iterated with the authors on the resolution of editor queries.

Jennifer Sue Bond, Program Director of the Science and Engineering Indicators Program, gave guidance and encouragement for the workshop, both for potential participants and for a follow-up publication of the papers. Colleagues within SRS, Alan I. Rapoport and Mark C. Regets, assisted in the preparation of the U.S. country paper. Jeanne Griffith, then Division Director of SRS, reviewed the U.S. paper, along with Mary J. Golladay, Program Director, Human Resources Statistics Program; Rolf F. Lehming, Program Director, Integrated Studies Program; Susan T. Hill, Director, Doctorate Data Project; and Joan S. Burrelli, Senior Analyst in SRS. These reviewers provided additional source material on U.S. and international graduate education and improved the presentation of the U.S. data. In addition, Paul W. Jennings of the NSF Graduate Education Program provided useful suggestions.

Several program directors within the Division of International Programs (INT) reviewed individual country papers: Richard R. Ries, Christine Galitzine, Mark Suskin, Jeanne E. Hudson, Larry H. Weber, Harold J. Stolberg and Laura Noto (INT Intern). Additional reviews were provided by program directors from the NSF research directorates: Norbert M. Bikales and Carmen I. Huber. External peer reviewers in the United States, who reviewed individual country papers, included Richard P. Suttmeier, Paul B. Pedersen, A.K. Jain, Maresi Nerad, Bernard Stein and Yii-Der Chuang. External peer reviewers from abroad included Cheng Kai-ming, Mark Bray, Nora Narvaez, Jean-Baptiste Meyer, Nick Jagger, Britt Marie Bertilsson, Gonzalo Ordonez, Heloisa Vilhena de Araujo, and Jacques Guillard. These external reviewers provided useful suggestions and in some cases significant national source material that improved the education indicators presented.

Jeanne Griffith introduced the workshop and highlighted international trends in graduate education in science and engineering. I chaired the Asian session, Bennett I. Bertenthal, Assistant Director for

Social, Behavioral and Economic Sciences (SBE) chaired the European session and Jennifer Sue Bond chaired the Latin American session. Dorothy S. Zinberg of Harvard University served as a discussant at the end of the workshop presentations.

Anne Houghton, Publications Manager for SRS, generously assisted in all phases of preparation for publication, arranging for external copyediting, formatting and composition of this report. Julia Harriston and Tanya Gore also assisted in the copyediting of

the report. Nita Congress edited all the papers for publication to establish more uniformity across country presentations. Phillip Coons, Krista Bruno, and Shawn Bryan of ROH Incorporated formatted the text tables, appendix tables and figures for all papers and provided composition services.

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