

Barriers and Opportunities in Completing Two- and Four-Year STEM Degrees

Committee

Shirley M. Malcom

Chair

SHIRLEY MALCOM is head of the directorate for Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. In 2003, Dr. Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy. She previously served as a member on a number of NRC committees including the National Committee on Science Education Standards and Assessment, Committee on Maximizing the Potential of Women in Academic Science and Engineering, and Panel on Technology and Women's Employment. Dr. Malcom serves on several boards including the Heinz Endowments, Public Agenda and Digital Promise. She is an honorary trustee of the American Museum of Natural History. Dr. Malcom serves as a regent of Morgan State University and as a trustee of Caltech. Dr. Malcom is a former trustee of the Carnegie Corporation of New York. She is a fellow of the AAAS and the American Academy of Arts and Sciences. She served on the National Science Board, the policymaking body of the National Science Foundation, and on the President's Committee of Advisors on Science and Technology. Dr. Malcom received her B.S. in zoology from the University of Washington, an M.A. in zoology from the University of California, Los Angeles, and a Ph.D. in ecology from Pennsylvania State University. She also holds 16 honorary degrees.

Cynthia J. Atman

Member

CYNTHIA J. ATMAN is the founding director of the Center for Engineering Learning & Teaching, a professor in human centered design and engineering, and the inaugural holder of the Mitchell T. & Lella Blanche Bowie endowed chair at the University of Washington (UW). She was director of the National Science Foundation-funded Center for the Advancement of Engineering Education, a national research center that was funded from 2003-2010. Dr. Atman joined the UW in 1998 after seven years on the faculty at the University of Pittsburgh. Her research focuses on engineering education pedagogy, engineering design learning, assessing the consideration of context in engineering design, and understanding undergraduate engineering student pathways. Dr. Atman was a member of the National Academy of Engineering/National Research Council Committee on Engineering Education. She is a fellow of the American Association for the Advancement of Science and the American Society of Engineering Education (ASEE). She was the recipient of the 2002 ASEE Chester F. Carlson Award for Innovation in Engineering Education and the 2009 UW David B. Thorud Leadership Award. Dr. Atman holds a Ph.D. in engineering and public policy from Carnegie Mellon University.

George R. Boggs

Member

GEORGE BOGGS is superintendent/president emeritus at Palomar College and president and CEO emeritus at the American Association of Community Colleges. Dr. Boggs is a clinical professor of higher education for the Roueche Graduate Center at National American University and an adjunct professor of higher education for San Diego State University. He served as a faculty member, division chair, and associate dean of instruction at Butte College in California and, for fifteen years, he served as the superintendent/president of Palomar College in California, after which he led the American Association of Community Colleges. Dr. Boggs has served on the boards of directors of the California Association of Community Colleges, the Community College League of California, the Western Association of Schools and Colleges, and the American Association of Community Colleges. Dr. Boggs is a member of the National Research Council's (NRC) Board on Science Education. He served as the chair of the NRC's Committee on Evolving Relationships and Dynamics Between Two- and Four-Year Colleges and Universities: A Summit and as a member of the NRC's Planning Committee for a Workshop Investigating Science Courses in the Undergraduate Context and the Committee on Undergraduate Science Education. He earned his B.S. in chemistry from The Ohio State University, an M.S. in chemistry from University of California, Santa Barbara, and a Ph.D. in education administration from the University of Texas, Austin.

Pamela Brown

Member

PAMELA BROWN is associate provost at New York City College of Technology of The City University of New York (City Tech/CUNY). Prior to this position, Dr. Brown served for seven years as dean of City Tech's School of Arts & Sciences. Dr. Brown has a track record of creating initiatives to improve the retention and recruitment of students interested in careers in science, technology, engineering, and math (STEM) fields. As dean, she helped obtain and oversee five grants from the National Science Foundation (NSF) totaling \$3.3 million to further this goal. She was the principal investigator of an NSF STEP project titled "Metropolitan Mentors: (MMNet): Growing an Urban STEM Talent Pool across New York City." This project included development of interdisciplinary summer bridge courses for engineering technology and science students, undergraduate research opportunities, and mentoring by City Tech alumni who were STEM graduate students from across NYC. During the 2011-12 academic year, Dr. Brown served as a program director in the Division of Undergraduate Education at NSF. Her responsibilities included oversight of the proposal review process, funding recommendations, and outreach to the larger scientific community. Dr. Brown has the distinction of being the first woman to earn a Ph.D in chemical engineering from Polytechnic University (now NYU-Poly).

Peter J. Bruns

Member

PETER BRUNS is the former vice president for grants and special programs at the Howard Hughes Medical Institute (HHMI), where he oversaw HHMI's programs to strengthen science education at all levels, advance public understanding and appreciation of science, and broaden access to science. He was integral in the creation of HHMI's South Africa initiative and continues to help direct the program. Before joining HHMI, Dr. Bruns was a faculty member in genetics at Cornell University. His research focused on the genetics and molecular biology of the single-celled organism *Tetrahymena thermophila*. He pioneered methods to manipulate the unusual nuclear composition of these organisms. Dr. Bruns established the Cornell Institute for Biology Teachers, which is designed to strengthen high school science instruction. He also expanded opportunities for Cornell students to conduct original laboratory research in biology and related disciplines. He is a current member of the National Research Council's Committee for National Academies Summer Institute on Undergraduate Education in Biology. Dr. Bruns received his B.A. from Syracuse University and a Ph.D. in cell biology from the University of Illinois.

Tabbye Chavous

Member

TABBYE CHAVOUS is professor and associate dean for academic programs and initiatives at the Rackham Graduate School at the University of Michigan (UM). Dr. Chavous' research interests and projects center around racial and gender identity development among African American adolescents and young adults and its relationship with students' academic identities, as well as implications for academic and psychological adjustment outcomes; transitions to secondary schooling and higher education among ethnic minority students; and racial and multicultural climates within secondary and higher education settings and implications for students' social and academic outcomes. She is a principal investigator and co-director of the UM's Center for the Study of Black Youth in Context. Funded through the National Science Foundation (NSF), the center focuses on research, training, and community outreach/engagement related to promoting positive development among diverse populations of black youth and families. Also, Dr. Chavous has funding through grants from the National Institutes of Health, the NSF, and the Spencer Foundation for research projects focusing on racial socialization processes among African American adolescents, psychological and contextual factors affecting college transitions among African American students; and on relationships among racial identity, racial discrimination, and well-being among ethnic minority college students. Dr. Chavous also has an NSF grant for a project examining academic identification processes among African American students pursuing academic pathways in science, technology, engineering, and mathematics (STEM) fields. Dr. Chavous received her Ph.D. in community psychology from the University of Virginia.

Charles De Leone

Member

CHARLES De LEONE is professor of physics at California State University, San Marcos (CSUSM) and Director of the CSUSM Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) Project. In his role as Chair of the CSUSM Physics Department, he oversaw the creation and implementation of what is now a thriving Physics degree program, and helped found the CSUSM Committee on Undergraduate Research. Professor De Leone is currently principal investigator and director of a joint CSUSM/Palomar College National Science Foundation (NSF) STEP Project that has a particular focus on attracting veterans to STEM fields. He has been the principal investigator and co-principal investigator on multiple private and federal grants aimed at developing, adapting, and implementing best practices science curriculum. He has experience in curriculum development and in physics education research including publications in the areas of multiple representations, student use of technology, and the efficacy of active-learning based pedagogy. He has worked as a consultant and leader in professional development programs nationwide. Dr. De Leone received a B.S. in physics from Santa Clara University and a Ph.D. in physics from the University of California, Davis.

Frank Dobbin

Member

FRANK DOBBIN is professor of sociology in the Department of Sociology at Harvard University. Dr. Dobbin studies organizations, inequality, economic behavior, and public policy. His publication *Inventing Equal Opportunity* shows how corporate personnel managers defined what it meant to discriminate. With Alexandra Kalev, he is developing an evidence-based approach to diversity management. Innovations that make managers part of the solution, such as mentoring programs, diversity taskforces, and special recruitment programs, have helped to promote diversity in firms, while programs signaling that managers are part of the problem, such as diversity training and diversity performance evaluations, have not. These findings have been covered by *The New York Times*, *The Washington Post*, *The Boston Globe*, *Le Monde*, *CNN*, and *National Public Radio*. Dr. Dobbin received his B.A. in sociology from Oberlin College and his Ph.D. in sociology from Stanford University.

S. James Gates, Jr.

Member

S. JAMES GATES Jr. is a University System of Maryland Regents Professor, John S. Toll Professor of Physics, and the Director of the Center for String and Particle Theory at the College. Park campus and is in his forty-first consecutive year of teaching physics and/or mathematics at the college level. Dr. Gates serves on the U.S. President's Council of Advisors on Science and Technology (PCAST), and the Maryland Board of Education. Dr. Gates is known for his groundbreaking scientific work in supersymmetry, supergravity, and string theory. In 1984, with M. T. Grisaru, M. Rocek, W. Siegel, Gates co-authored *Superspace*, the first comprehensive book on the topic of supersymmetry which is still considered a standard in the field almost three decades later. Prof. Gates has appeared in many video documentary programs including *The Elegant Universe*, *Einstein's Big Idea*, *Fabric of the Cosmos*, *The Hunt for the Higgs*, and *"Mankind: The Story of all of US."* He is a Fellow of the American Physics Society, American Association for the Advancement of Science, National Society of Black Physicists, and British Institute of Physics. He is also a member of the Board of Trustees of Society for Science & the Public, the Board of Advisors for the Department of Energy's Fermi National Laboratory, an elected member of the American Academy of Arts and Sciences, and the American Philosophical Society. He is a recipient of the 2011 Medal of Science, the highest recognition given by the U.S. government to scientists with the citation, For his contribution to the mathematics of supersymmetry in particle, field, and string theories and his extraordinary efforts to engage the public on the beauty and wonder of fundamental physics. In 2013, he was elected to the National Academy of Sciences, becoming the first African-American physicist so recognized in its 150-year history. Prof. Gates holds two B.S. degrees (mathematics and physics) and a Ph.D. in Physics all from MIT.

Sylvia Hurtado

Member

SYLVIA HURTADO is professor and director of the Higher Education Research Institute at University of California, Los Angeles (UCLA) in the Graduate School of Education and Information Studies. Dr. Hurtado is a member of the National Research Council's Board on Higher Education and the Workforce. She has published numerous articles and books related to her primary interest in student educational outcomes, campus climates, college impact on student development, and diversity in higher education. She is past president of the Association for the Study of Higher Education. Black Issues In Higher Education named her among the top 15 influential faculty who personify scholarship, service, and integrity, and whose work has had substantial impact in high education. Dr. Hurtado has coordinated several national research projects, including a U.S. Department of Education-sponsored project on how colleges are preparing students to achieve the cognitive, social, and democratic skills to participate in a diverse democracy. She currently directs a national longitudinal study on the preparation of underrepresented students for STEM careers sponsored by the National Institutes of Health and the National Science Foundation. She has also studied assessment, reform, and innovation in undergraduate education. She obtained her Ph.D. in education from UCLA, Ed.M. from Harvard Graduate School of Education, and A.B. in sociology from Princeton University.

Leah H. Jamieson

Member

LEAH H. JAMIESON is John A. Edwardson dean of engineering and Ransburg distinguished professor of electrical and computer engineering at Purdue University. Dr. Jamieson is co-founder and past director of the Engineering Projects in Community Service (EPICS) program. Dr. Jamieson, along with EPICS co-founder Edward J. Coyle and co-director William C. Oakes were awarded the National Academy of Engineering's 2005 Bernard M. Gordon Prize for Innovation in Engineering and Technology Education. Dr. Jamieson is a member of the National Academy of Engineering. Prior to her appointment as dean, Dr. Jamieson served as co-chair of Purdue's Engineering Curriculum reform task force. The task force is considering the global and technological changes that will shape engineering over the next 20 years, identify the attributes that will characterize Purdue engineering graduates of the future, and develop the key attributes of an engineering curriculum that prepares students for 21st century careers. Dr. Jamieson received a B.S. in mathematics from the Massachusetts Institute of Technology, and an M.S.E., an M.A., and a Ph.D. in electrical engineering and computer science, all from Princeton University.

Adrianna Kezar

Member

ADRIANNA KEZAR is a professor for higher education at the University of Southern California (USC) and is co-director of the Pullias Center for Higher Education. She joined the faculty at USC in 2003. She has several years of administrative experience in higher education as well both in academic and student affairs. Dr. Kezar is a national expert of change, governance, and leadership in higher education and her research agenda explores the change process in higher education institutions and the role of leadership in creating change. She has spent over a decade exploring ways to institutionalize changes to support undergraduate STEM reform. Dr. Kezar is also a qualitative researcher and has written several texts and articles about ways to improve qualitative research in education. In 2011, she had two new books: *Recognizing and Serving Low Income Students* (Routledge, 2011) and *Enhancing Campus Capacity for Leadership* (Stanford Press, 2011). Other recent previous books include: *Understanding the new majority of non-tenure track faculty* (Jossey Bass, 2010), *Organizing for collaboration* (Jossey Bass, 2009), *Rethinking leadership practices in a complex, multicultural and global world* (Stylus Press, 2009), *Rethinking the "L" Word in Higher Education: The Revolution of Research on Leadership* (Jossey Bass, 2006), *Higher Education for the Public Good* (Jossey Bass, 2005). She has acquired over \$6 million dollars in grant funding and has worked on grant-funded projects exceeding \$12 million dollars on a variety of projects to fundamentally improve higher education, including a recent grant from the National Science Foundation to study networks formed to work with faculty in STEM to improve undergraduate education. Dr. Kezar holds a Ph.D. and an M.A. in higher education administration from the University of Michigan and a B.A. from the University of California, Los Angeles.

Kenneth R. Koedinger

Member

KENNETH R. KOEDINGER is a professor of human computer interaction and psychology at Carnegie Mellon University. Dr. Koedinger's research interests include creating educational technologies that dramatically increase student achievement. Dr. Koedinger has created 'Cognitive Models,' computer simulations of student thinking and learning that are used to guide the design of educational materials, practices, and technologies. These 'Cognitive Models' provide the basis for an approach to educational technology called 'Cognitive Tutors' that support learning within rich problem-solving environments. With his colleagues, he has developed 'Cognitive Tutors' for mathematics, science, and language and has tested them in the laboratory and as part of real courses. Dr. Koedinger's research has contributed new principles and techniques for the design of educational software and has produced basic cognitive science research results on the nature of mathematical thinking and learning. Dr. Koedinger has authored over 180 peer-reviewed publications, has received many best paper awards, and has been funded by over 30 grants. Dr. Koedinger is a co-founder of Carnegie Learning, Inc. and leads LearnLab, the Pittsburgh Science of Learning Center (see learnlab.org). Dr. Koedinger received a B.S. in mathematics and an M.S. in computer science both from the University of Wisconsin-Madison and a Ph.D. in cognitive psychology from Carnegie Mellon University.

Muriel E. Poston

Member

MURIEL POSTON is the dean of faculty and vice-president of academic affairs at Pitzer College. She is a former dean of the faculty and vice president of academic affairs at Skidmore College. During her tenure as dean at Skidmore, Dr. Poston worked with colleagues to develop a new vision for science education that involved integrating disparate perspectives from across the physical, life and social sciences. Recently she was the division director for human resource development in the Education and Human Resources Directorate at the National Science Foundation (NSF). Dr. Poston led eight NSF programs that explicitly focused on supporting minority-serving institutions and underrepresented groups in science, technology, engineering, and mathematics (STEM). Dr. Poston was a faculty member in the biology/botany department at Howard University. She has also served as the deputy division director for the NSF's Division of Biological Infrastructure. Her expertise in plant systematics, environmental law and environmental policy has taken her across the globe. Dr. Poston has received research and academic grants including ones from the NSF, the National Institute of Environmental Health Sciences, and the Smithsonian Institution. Dr. Poston has authored dozens of articles in publications such as *Journal of Women and Minorities in Science and Engineering*, *Plant Science Bulletin* and *ACADEME*. She is a former member of the National Research Council's Board on Life Sciences. Dr. Poston currently serves on the board of directors for the American Institute of Biological Sciences. Dr. Poston earned her B.A. from Stanford University and both an M.A. and a Ph.D. from the University of California, Los Angeles. Dr. Poston also holds a J.D. from the University of Maryland.

Mark B. Rosenberg

Member

MARK B. ROSENBERG is the fifth president of Florida International University (FIU), where he oversees an expansion of FIU's investments into STEM education, including partnerships with local schools, community colleges, and community organizations to ensure that the FIU entering student body is STEM capable. A political scientist specializing in Latin America, Dr. Rosenberg is the first FIU faculty member to ascend to the university's presidency. From 2005 to 2008, Dr. Rosenberg served as chancellor for the board of governors of the State University System (SUS) of Florida. As chancellor, Dr. Rosenberg led the system's strategic development and financial planning and policy initiatives, working closely with Governors Jeb Bush and Charlie Crist and the legislature to secure support for SUS priorities. Prior to becoming chancellor, Dr. Rosenberg served as provost and executive vice president for academic affairs, during which time he was integrally involved in the expansion and development of FIU into a major public research university. Dr. Rosenberg has written or co-edited seven books and numerous scholarly articles in leading journals including the *Latin American Research Review* and the *Hispanic American Historical Review*. His latest book, *The United States and Central America: Geopolitical Realities and Regional Fragility* (2007). Governmental and media organizations have frequently sought Dr. Rosenberg's expertise on Latin America. He is a member of the Council on Foreign Relations, has testified before Congress numerous times regarding U.S.-Latin American relations and has served as a consultant to the U.S. Department of State and the U.S. Agency for International Development. Dr. Rosenberg received a B.A. in political science from Miami University, an M.A. and a Ph.D. in political science from the University of Pittsburgh.

P. U. Treisman

Member

P. Uri Treisman is professor of mathematics at The University of Texas at Austin and director of the Charles A. Dana Center. The Dana Center maintains an active program of policy research and evaluation in support of efforts to raise educational standards and to enhance the state's educational accountability system. Dr. Treisman continues his long-standing work in designing programs that strengthen the teaching and learning of mathematics and science. For his work in developing programs to strengthen the education of minority and rural students he received a MacArthur Fellowship in 1992 and, in 1990, was named by Newsweek as one of three American educators on the leading edge of innovation. Dr. Treisman serves on the Policy and Priorities Committee of the Education Commission of the States and is a founding board member of the National Center for Public Policy in Higher Education. He also serves on the 21st Century Commission on the Future of Community Colleges, an initiative of the American Association of Community Colleges. He is the president of the board of the Consortium for Mathematics and its Applications (COMAP). He has served on numerous National Research Council committees including the Committee on a Strategic Education Research Plan (SERP): Bridging Research and Practice; the Special Oversight Commission for the Mathematics Learning Study; the Center for Science, Mathematics, and Engineering Education Advisory Board; and the Committee on Understanding the Influence of Standards in K-12 Science, Mathematics, and Technology Education. Dr. Treisman is a founding member of the Texas Commission on Volunteerism and Community Service. He received a B.S. in mathematics, summa cum laude, from the University of California, Los Angeles. He received an interdisciplinary Ph.D. from the University of California at Berkeley, where he studied both mathematics and education.

Michelle Van Noy

Member

MICHELLE VAN NOY is a research project manager at the Rutgers University Heldrich Center for Workforce Development. She conducts research on the role of higher education, particularly community colleges, in workforce development. Dr. Van Noy's current research focuses on effective practices in community college workforce programs, collaborations between higher education and the workforce system, and student pathways and outcomes in higher education. She previously worked at the Community College Research Center at Teachers College, Columbia University where she conducted studies of contextualized basic skills education, employer perceptions of the associate degree for information technology technician jobs, and community college noncredit workforce education. She also previously worked at Mathematica Policy Research, Inc., on numerous national studies, including evaluations of the School-to-Work, Unemployment Insurance, Welfare-to-Work, and Trade Adjustment Assistance programs, and a study of information technology certification programs in high schools and community colleges. Dr. Van Noy received a B.A. in psychology and Spanish, and an M.S. in public policy; both from Rutgers University. Dr. Van Noy holds a Ph.D. in sociology and education from Columbia University.

X. Ben Wu

Member

X. BEN WU is a professor of ecology and associate dean of faculties and director of the Center for Teaching Excellence at Texas A&M University. His research interests are landscape ecology and ecology education. He and his collaborators have been exploring web-based, authentic ecological inquiries in large introductory ecology courses and their impact on student learning and attitudes. He is responsible for organizing the efforts in faculty professional development in teaching at Texas A&M University and has conducted projects and workshops in inquiry-based learning, blended learning, engaging students with technology, and peer review of teaching. He co-chaired the university committee to develop the institutional Quality Enhancement Plan, Aggies Commit to Learning for a Lifetime, for the recent decennial reaffirmation of accreditation of Texas A&M University. Dr. Wu received his B.S. in botany from the Lanzhou University in China before he entered the University of Tennessee where he received M.S. degrees in ecology and management science and a Ph.D. in ecology. He was a post-doctoral fellow and adjunct assistant professor at the Ohio State University before he joined the faculty at Texas A&M.