Developing Indicators for Undergraduate STEM Education

Committee

Mark B. Rosenberg

Chair

MARK 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, he is the first FIU faculty member to ascend to the university's presidency. From 2005 to 2008, he served as chancellor for the board of governors of the State University System (SUS) of Florida. As chancellor, he led the system's strategic development and financial planning and policy initiatives, working closely with Governor Charlie Crist and the legislature to secure support for SUS priorities. Prior to becoming chancellor, he served as provost and executive vice president for academic affairs at FIU. He 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. 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. He has also served as a member of the National Academies of Sciences, Engineering, and Medicine study on Barriers and Opportunities in Completing Two- and Four- Year STEM Degrees. He 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.

Heather Belmont

Member

HEATHER BELMONT is dean of the School of Science at Miami Dade College (MDC). During her career at MDC, she has served as faculty, chairperson of the Biology, Health/Wellness and Funeral Services Departments, and director of the Biotechnology Program. She has also been instrumental in securing and administering millions in external grant funding from the U.S. Department of Education, National Science Foundation, and U.S. Department of Agriculture. Under her leadership, the School of Science has established an intrusive, in-house science advisement system, an extensive peer-led, team-learning network, and an undergraduate research program on five of MDC's eight campuses. Prior to joining MDC in 2005, Dr. Belmont worked for Sunol Molecular Corporation and Altor Bioscience Corporation, where she conducted research on therapeutic anti-viral and anti-cancer biologics. She has co-authored multiple peer-reviewed journal articles, two patent applications, serves on multiple boards, and is a Partnership for Undergraduate Life Science Education (PULSE) Leadership fellow. She earned a B.A. from Ithaca College and a Ph.D. in neuroscience from the University of Miami.

Charles F. Blaich

Member

CHARLES BLAICH is the director of the Center of Inquiry and the Higher Education Data Sharing Consortium (HEDS) at Wabash College. His academic research looks at the auditory communication in zebra finches. With this research, undergraduate students were collaborators in his laboratory as well as co-authors on all of his papers and conference presentations. He received teaching awards from the University of Connecticut, Eastern Illinois University and Wabash College. He collaborated with researchers at the University of Iowa, University of Michigan, Miami University and ACT to design and implement the Wabash national Study of Liberal Arts Education in 2005. Since then, forty-nine colleges and universities have participated in the longitudinal research project on the practices and conditions that support student learning. At the Center of inquiry, he and his colleagues work with faculty, staff, and students at hundreds of colleges and universities to use evidence from the Wabash Study and other forms of assessment evidence to improve student learning. At HEDS, he shares surveys and institutional data to help improve the educational effectiveness of the 134 member institutions. He has also implemented a Council on Undergraduate Research project to investigate the benefits of working with slate systems and consortia of institutions as a means of making undergraduate research accessible to more students. He serves on an advisory panel for a Helmsley Charitable Trust funded project in the California State University system to enhance access to STEM education for underrepresented minorities. He received a B.S. in psychology, an M.A. in experimental psychology and a Ph.D. in developmental psychology from the University of Connecticut.

Mark Connolly

Member

MARK CONNOLLY is an associate research scientist at the University of Wisconsin-Madison. He is also the principal investigator for the Wisconsin Center for Education Research where he directs and coordinates research activities among UW researchers, liaises with administrative personnel at UW and in funding agencies, and supervises support staff. He also assists with study design, data collection and analysis, and writing results. His areas of study include postsecondary teaching and learning, graduate education, academic careers, and educational reform in science, technology, engineering, and mathematics (STEM). He is the principal investigator of the NSF-funded Longitudinal Study of Future STEM Scholars, a five-year, mixed-methods research project investigating the effects of future-faculty professional development programs on doctoral students in science, engineering, and mathematics. He also serves as an evaluator-researcher for the Center for the Integration of Research, Teaching, and Learning (CIRTL). He received his Ph.D. in higher education from Indiana University at Bloomington in 2005.

Stephen W. Director

Member

STEPHEN DIRECTOR (NAE) is senior advisor to the president of Northeastern University, having previously served as provost and senior vice president for academic affairs from 2008 to 2015. Prior to joining Northeastern he held a number of academic positions including provost and senior vice president for academic affairs at Drexel University and Robert J. Vlasic dean of engineering and professor of electrical engineering and computer science at the University of Michigan. From 1977 until 1996 he was at Carnegie Mellon University (CMU) where he was the U. A. and Helen Whitaker university professor of electrical and computer engineering and served as head of the Department of Electrical and Computer Engineering and then dean of the College of Engineering. He founded the SRC-CMU Research Center for Computer-Aided Design and served as its director. Prior to joining CMU he was with the Department of Electrical Engineering at the University of Florida, Gainesville. He is a fellow of both the Institute of Electrical and Electronics Engineers (IEEE) and the American Society of Engineering Education (ASEE). He has received numerous awards for his research and educational contributions including the ASEE Benjamin Garver Lamme Award, the IEEE Millennium Medal, the IEEE Education Medal and the Aristotle Award from the Semiconductor Research Corporation (SRC). He received a B.S. from the State University of New York at Stony Brook, an M.S. and a Ph.D. in electrical engineering from the University of California, Berkeley.

Kevin Eagan

Member

KEVIN EAGAN is assistant professor in residence in the Department of Education and managing director of the Higher Education Research Institute (HERI) at University of California, Los Angeles (UCLA). Dr. Eagan also serves as director of the Cooperative Institutional Research Program (CIRP), the longest-running and largest empirical study of higher education in the country. As managing director of HERI, Dr. Eagan coordinates HERI's funded research projects and oversees the development, administration, and analysis of the Institute's five national surveys. Dr. Eagan's research interests include issues related to undergraduate science, technology, engineering, and mathematics (STEM) education; contingent faculty; student retention; institutional contexts and structures of opportunity; survey validity and reliability; and advanced quantitative methods. He currently serves as principal investigator with Dr. Sylvia Hurtado on a National Institutes of Health and National Science Foundation-funded project that examines students' pathways through STEM postsecondary education and into the labor force. He obtained his Ph.D. in higher education and organizational change from UCLA, his M.S. in higher education administration from North Carolina State University, and his B.S. in mathematics from Greensboro College.

Susan Elrod

Member

SUSAN ELROD is the interim provost and vice president for Academic Affairs at California State University, Chico. She went to Chico after serving as dean of the College of Science and Mathematics at California State University, Fresno. At Fresno, she led initiatives at the university, state and national levels that focused on improving student success and faculty development in STEM disciplines, while enhancing support for research and expanding community and industry engagement. Prior to Fresno, she served as executive director of Project Kaleidoscope (PKAL) at the Association of American Colleges and Universities (AAC&U) in Washington, DC. During her tenure at PKAL, she led several multi-campus, national STEM education reform initiatives that focused on interdisciplinary learning, sustainability, and STEM student transfer success. She also expanded PKAL's national program of regional faculty networks and led PKAL's Summer Leadership Institute for emerging faculty leaders in the STEM disciplines. She continues to serve as a senior scholar at AAC&U and as an advisor and investigator on several state and national projects. She is also an advisor to the California State University system-wide STEM initiatives and a consultant for the WASC Senior Colleges and Universities Commission. She received a B.S. in biological science from California State University at Chico and a Ph.D. in genetics from the University of California, Davis.

Dr. Kaye H. Fealing

Member

KAYE HUSBANDS FEALING is chair of the School of Public Policy at the Georgia Institute of Technology. She specializes in science and innovation policy, underrepresentation of women and minorities in STEM disciplines and occupations, and international trade policy impacts on industry structure and firm behavior. Previously, as a professor in the Center for Science, Technology and Environmental Policy at the University of Minnesota, she received several teaching awards. She also directed a National Research Council study of the NSF Science and Technology Indicators. Prior to the Humphrey School, she was the William Brough professor of economics at Williams College. At NSF, she was the inaugural program director for the Science of Science and Innovation Policy program (SciSIP) and also served as an economics program director. She co-edited The Science of Science Policy: A Handbook, with Julia Lane, John H. Marburger III and Stephanie Shipp. She also coedited the National Academy of Sciences report entitled Capturing Change in Science, Technology, and Innovation: Improving Indicators to Inform Policy, with Robert E. Litan and Andrew W. Wyckoff. She serves on American Association for the Advancement of Science (AAAS) committees and, in the past, on NSF's Social, Behavioral and Economic Sciences Advisory Committee. She earned a B.A. in mathematics and economics from the University of Pennsylvania and a Ph.D. in economics from Harvard University.

Stuart I. Feldman

Member

STUART FELDMAN was vice president of engineering at Google. Prior to joining Google, he worked at IBM as their vice president for computer science in research, as vice president for internet technology, and as director of their Institute for Advanced Commerce. Before joining IBM, he was a computer science researcher at Bell Labs and a research manager at Bellcore (now Telcordia). He is a former president of the Association for Computing Machinery (ACM), as well as a member of the board of directors of the Association Advance Collegiate Schools of Business (AACSB). He is a fellow of several professional associations including: the Institute of Electrical and Electronics Engineers (IEEE), the Association for Computing Machinery (ACM), and the American Association for the Advancement of Science (AAAS). He also serves on several government advisory committees. He received his Ph.D. in applied mathematics from the Massachusetts Institute of Technology. He received an honorary doctor of mathematics from the University of Waterloo.

Charles Henderson

Member

CHARLES HENDERSON is a professor of physics and of the Mallinson Institute for Science Education at Western Michigan University. He is the co-director of the Center for Research on Instructional Change in Postsecondary Education and the senior editor for the Physical Review Special Topics – Physics Education Research. Prior to WMU, he taught physics courses at Macalester College and at Anoka- Ramsey Community College. He also was a high school physics and chemistry teacher at the International School of Minnesota for two years. His current research studies the teaching and learning of physics with a focus on the development of theories and strategies for promoting change in the teaching of STEM subjects. These include issues related to the diffusion and adoption of research-based instructional strategies. He has numerous service and professional recognitions including: member of the National Research Council Committee on Undergraduate Physics Education Research and Implementation, editor of the Physics Education Research Section of the American Journal of Physics (2008-2012), president of the Michigan section of the American Association of Physics Teachers (2008-2009), chair of the American Association of Physics Teachers Committee on Research in Physics Education, and a member of the Physics Content Advisory Committee for the Michigan Test for Teacher Certification. He received a B.A. in mathematics and physics from Macalester College, an M.S. in physics and a Ph.D. in physics education from the University of Minnesota.

Lindsey Malcom-Piqueux

Member

LINDSEY MALCOM-PIQUEUX is the associate director for research and policy at the Center for Urban Education in the Rossier School of Education at the University of Southern California. She is also a part- time faculty member at the Department of Educational Leadership in the Graduate School of Education and Human Development at the George Washington University. Her primary interest centers on postsecondary access and success for minority women and men in STEM fields. Following this interest, she has conducted research in several areas including the relationship between financial aid and STEM outcomes, the role of four-year minority serving institutions and community colleges in creating educational equity in STEM, and gender equity in STEM among minority populations. She also studies the educational experiences and outcomes of students of color at historically Black Colleges and Universities, predominantly Black institutions, Hispanic-serving institutions, and Tribal Colleges and examines the congruence of the minority-serving designation and academic outcomes among their target populations. She received a B.S. in planetary science from the Massachusetts Institute of Technology, an M.S. in planetary science from the California Institute of Technology and a Ph.D. in urban education with an emphasis on higher education from the University of Southern California.

Marco Molinaro

Member

MARCO MOLINARO is the assistant vice provost for Undergraduate Education and director of the iAMSTEM Education Hub at the University of California, Davis. He is also the chief education officer for the Center for Biophotonics, Science and Technology. He has been a project director of numerous nationally funded STEM educational and training programs for middle school through college and has developed and taught multiple undergraduate courses. He has over 18 years of educational experience creating and leading applications of technology for instruction, scientific visualization and simulation, curriculum, and science exhibits for students from elementary school through graduate school and for the general public. The educational technology products he has developed are still in use many years later as part of nationwide curricular projects such as FOSS (upper elementary and middle school science), Chemlinks (undergraduate chemistry instruction) and Nanozone.org (public exhibit on nanotechnology). At UC Davis he currently leads a university-wide STEM education effort working across all STEM disciplines to improve undergraduate STEM student success – the iAMSTEM Hub. The Hub focuses on 3 stragegies: 1) catalyze cultrual change and develop communitites; 2) Foster innovations in instrucion, assessment, curriculum, and experiences; and 3) Build and share analytic tools and architecture to measure and imporve STEM teaching and learning. His projects have been funded through the NSF, NIH and various private foundations such as Gates and Intel. He received a B.S. in biophysics and chemistry from Wayne State University and a Ph.D. in biophysical chemistry from the University of California, Berkeley.

Rosa Rivera-Hainaj

Member

ROSA RIVERA-HAINAJ has been the Dean of Science and Mathematics at Lorain County Community College (LCCC) since 2011. Prior to her appoint, Dr. Rivera-Hainaj was associate professor of Chemistry at Purdue University North Central, assistant professor of Chemistry at James Madison University and an active researcher in the fields of chemistry and biochemistry. She has been awarded and supervised numerous grants by the National Science Foundation, NASA, the Indiana Department of Education, James Madison University, among others. In her current role Dr. Rivera-Hainaj administers a budget of $4.5+ million, serves as member of the Core Team of the Student Success Agenda and is a leader within LCCC and the community it serves. Dr. Rivera-Hainaj earned a B.S. in Chemistry from the University of Puerto Rico – Mayaguez, PR and a Ph.D. in Biochemistry from Case Western Reserve University in Cleveland, OH.

Gabriela C. Weaver

Member

GABRIELA WEAVER serves as vice provost for Faculty Development, and director of the Center for Teaching and Faculty Development at the University of Massachusetts, Amherst. In her early career as an assistant professor in the Department of Chemistry at the University of Colorado at Denver she shifted the focus of her research work from physical chemistry to STEM education. From 2001 to 2014 she served on the faculty at Purdue University as associate professor and professor of chemistry and science education and later as the Jerry and Rosie Semler Director of the Discovery Learning Research Center. In 2012, she was elected as a fellow of the American Association for the Advancement of Science for distinguished contributions to transforming science education at the undergraduate and pre-college levels through the use of inquiry-based pedagogies and innovative technologies. She has been a co-author on two different first-year chemistry textbooks, and numerous book chapters on topics in science education and the 2015 book Transforming Institutions: Undergraduate STEM Education for the 21st Century. From 2004-2012, she served as director of the NSF-funded multi-institutional CASPiE project (Center for Authentic Science Practice in Education) dedicated to involving first- and second-year undergraduate students in real research experiences as part of their regular laboratory course curricula. Her research interests include the development, implementation and evaluation of instructional practices that engage students and improve their understanding of science, and the institutionalization of such practices through the transformation of cultures and processes in higher education. She earned a B.S. degree in chemistry from the California Institute of Technology and a Ph.D. in chemical physics from the University of Colorado at Boulder.

Yu Xie

Member

YU XIE (NAS) is the Otis Dudley Duncan distinguished university professor of sociology and statistics and is a professor at the Ford School of Public Policy at the University of Michigan. He is also a research professor at the Population Studies Center and the Survey Research Center of the Institute for Social Research and a faculty associate at the Center for Chinese Studies. Previously he has also served as associate chair of the Sociology Department, and as associate director of the Population Studies Center at the University of Michigan. His main areas of interest are social stratification, demography, statistical methods, Chinese studies, and sociology of science. He is a member of the American Academy of Arts and Sciences, Academia Sinica, and the National Academy of Sciences. He received the Distinguished Lecturer Award at the Center for the Study of Women, Science, and Technology at the Georgia Institute of Technology, and was a Henry and Bryna David Lecturer of the National Research Council. He received a B.S. in metallurgical engineering from the Shanghai University of Technology, a M.S. in Sociology, an M.A. in the History of Science and a Ph.D. in Sociology all from the University of Wisconsin-Madison.