

The Status, Role, and Needs of Engineering Technology Education in the United States

Committee

Katharine G. Frase

Co-Chair

Katharine Frase, committee co-chair, was appointed Vice President and Chief Technology Officer, IBM Public Sector, in March 2013. As CTO, she provides thought leadership for IBM and its customers on innovation and strategic transformation specific to government, education, life sciences, healthcare and cities, driving the creation of new solutions. Prior to this role, she was Vice President, Industry Solutions Research, working across IBM Research on behalf of IBM clients, to create transformational industry-focused solutions, including the application of IBM Watson technologies to business applications and the realization of Smarter Planet solutions. Earlier roles included technical and business strategy for IBM's software business, corporate assignments on technology assessment and strategy, and roles in IBM Microelectronics in the management of process development, design/modeling methodology and production of chip carriers, assemblies and test. In 2006, she was elected as a member of the (U.S.) National Academy of Engineering. Dr. Frase received an A.B. in chemistry from Bryn Mawr College and a Ph.D. in materials science and engineering from the University of Pennsylvania. She is a member of the IBM Academy of Technology and sits on numerous external committees and boards.

Ronald M. Latanision

Co-Chair

Ronald Latanision, committee co-chair, is a Senior Fellow at Exponent, Inc., an engineering and scientific consulting company. Prior to joining Exponent, Dr. Latanision was the and held joint faculty appointments in the Department of Materials Science and Engineering and in the Department of Nuclear Engineering. He led the School of Engineering's Materials Processing Center at MIT as its Director from 1985 to 1991. He is now an Emeritus Professor at MIT. In addition, he is a member of the National Academy of Engineering and a Fellow of ASM International, NACE International, and the American Academy of Arts and Sciences. From 1983–1988, Dr. Latanision was the first holder of the Shell Distinguished Chair in Materials Science. He hosts the annual Siemens Science and Technology Competition on the MIT campus. Dr. Latanision was a founder of Altran Materials Engineering Corporation, established in 1992.

Walter W. Buchanan

Member

Walter Buchanan is a professor in the Department of Engineering Technology and Industrial Distribution, College of Engineering, Texas A&M University. Previously, Dr. Buchanan was professor and director of the School of Engineering Technology at Northeastern University. Other academic posts include professor and dean of Engineering and Industrial Technologies at the Oregon Institute of Technology; associate professor and chair of Engineering Technology and Industrial Studies at Middle Tennessee State University; assistant professor and coordinator of the Electrical Engineering Technology Associate Degree Program at the University of Central Florida; and assistant professor of electrical engineering technology at Indiana University-Purdue University at Indianapolis. He has also been an electronics engineer for the Naval Avionics Center; an engineering officer for the U.S. Navy; an aerospace engineer for Boeing Co. and Martin Co., as well as an attorney for the Veterans Administration in Indianapolis. Buchanan is Past President of the American Society for Engineering Education (ASEE) and is a Fellow of the ASEE. He is a Fellow of the National Society of Professional Engineers (NSPE) and a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and the Society of Manufacturing Engineers (SME). He is a past member of the Board of Directors of NSPE, and past chair of the Engineering Technology Council of ASEE, the Professional Engineers in Higher Education of NSPE. He is a past member of the Executive Committee of the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET). Buchanan is a recipient of the ASEE James H. McGraw Award, the ASEE Frederick J. Berger Award, the NSPE Outstanding Service Award, and the International Conference on Engineering and Computer Education Award. He is on the editorial or advisory boards of the Journal of Engineering Technology, the International Journal of Modern Engineering, the American Journal of Engineering Education, the International Journal of Engineering Research & Innovation, and the Technology Interface International Journal, and has authored or co-authored over 200 publications. He has also done consulting for over twenty different organizations and has been a principal investigator for NSF and other grants. Buchanan holds a Bachelor's in degree mathematics and languages, and Bachelor's and Master's degrees in interdisciplinary engineering, as well as law degree and PhD in higher education.

Imelda (Mel) E. Cossette

Member

Mel Cossette is Executive Director and Principal Investigator of the National Resource Center for Materials Education Technology, a National Science Foundation Advanced Technological Education Center housed at Edmonds Community College in Lynnwood, Washington. The center engages nationally with materials science, advanced manufacturing and engineering technology programs. Ms. Cossette is also a PI for the NSF-funded National Educators Workshop, a three-day special professional development forum that brings 2- and 4-year instructors, K-12 teachers, and industry together around material science and STEM education. She serves as a Co-PI on two other NSF grants: The National Resource Center for Aerospace Technical Education (SpaceTEC), an NSF ATE center based in eastern Florida, where she helped develop a national certification for composites and assisted in the development of a national level certification examination focused on manufacturing; and the Revolutionizing Metallic Biomaterials-Engineering Research Center, at North Carolina Agricultural and Technology State University. She was the PI on an NSF-funded project, Proven Practices and Strategies for Recruitment of Women and Underrepresented Populations into STEM Careers, which documented proven practices in the recruitment of women and underrepresented populations into science, technology, engineering and mathematics. Previous employment included a position of Program Manager and trainer with the International Association of Machinists/Boeing Joint Programs and supervisor of work-based learning programs at Lake Washington Institute of Technology. Ms. Cossette has also worked as a property manager for a public market, senior merchandise manager at J.C. Penney Co., and in public relations for the U.S. Department of Energy. She serves on numerous boards such as the National Coalition for Advanced Technology Centers, Latino Educational Training Institute, High Technology Education Exchange Conference, and the Washington Skills USA/Technology Student Association. Ms. Cossette has a Master's of Education degree from City University of Seattle and a Vocational Education Certificate from Shoreline Community College, both in Washington State.

Werner Eikenbusch

Member

Werner Eikenbusch is Manager of Talent Management for Corporate HR, Americas Region, at BMW Manufacturing Co., LLC, in Spartanburg, South Carolina. Eikenbusch, himself a product of apprenticeship and engineering programs in Germany and the USA, helped create several new talent development programs for BMW. Most notably, the BMW Scholars program, created in 2011, is a dual study/work education program in which students enroll full time at local technical colleges for two years while also training as apprentices in the BMW factory for 20 hours a week; the Engineering & Operations Management Development Program, created in 2008, develops recent college graduates through a 2 year rotational program. Eikenbusch was previously a HR Manager for BMW of North America, Inc. in New Jersey and, before that, was a manufacturing engineer for BMW AG in Munich. He holds a MS degree in Management Engineering from the New Jersey Institute of Technology, where he was also a Fulbright Scholar, and a Dipl. Ing. (FH) Maschinenbau, earned in Germany.

Christopher R. Fox

Member

Christopher Russell Fox is a manufacturing engineering teacher at Atholton High School in Howard County Maryland, a position he has held since 2009. From 2003 to 2009, he was a technology education teacher at Folly Quarter Middle School, also in Howard County. Fox has advanced degrees in career and technical education from the University of Maryland Eastern Shore, and in administration and supervision from the Johns Hopkins University. His undergraduate degree is from Western Michigan University in vocational education with a concentration in machine tool technology and computer aided drafting and a minor in English education. He has an associates in applied science in machine tool technology from Southwestern Michigan College. He has helped write curriculum for the Howard County Public School System, the Utah Online Charter Schools (in computer science), the International Technology and Engineering Educators Association (Engineering by Design program), and the State of Maryland (Voluntary State Curriculum). He has a certificate in engineering education through Project Lead the Way, earned at the University of Maryland Baltimore County. He has successfully raised money to support student teams participating in FIRST robotics in Howard County.

Joyce Gleason

Member

Joyce M. Gleason has been an educational consultant for 30 years. Her clients have included Annenberg Media and the Smithsonian Institution. Gleason has also conducted staff development sessions for Boston, Southbridge, and Hadley Public Schools in Massachusetts and strategic planning workshops for the National Science Teachers Association, the Connecticut Science Teachers Association, and the Massachusetts Association of Science Teachers. Previous jobs include Director of Outreach for the Annenberg/CPB Channel (now Annenberg Learner), based at the Science Media Group of Harvard-Smithsonian Center for Astrophysics; science curriculum liaison with the Worcester (MA) public school system, where she helped introduce a K-12 technology/design engineering curriculum; and 26 years as a high school biology teacher. Gleason has an AB degree in the biological sciences from Mount Holyoke College, an MALS in science from Wesleyan University, and a C.A.E.S. in curriculum and instruction from Boston College. She was selected the 2000 Science Teacher of the Year by the Massachusetts Association of Science Teachers.

Daniel Hull

Member

Daniel Hull is the principal investigator and executive director of the NSF/ATE-funded National Center for Optics and Photonics Education. Prior to his role at the center, Hull founded the Center for Occupational Research and Development, an organization focusing on technician preparation, which he led from 1979 to 2006. Hull is the author of several books on technician preparation and contextual teaching, including *Career Pathways for STEM Technicians* (2012), *Adult Career Pathways* (2007), and *Career Pathways: Education with a Purpose* (2005). Dan is a registered professional engineer with 13 years of practice in the laser field and over 30 years of experience leading education reform efforts in the United States and throughout the world.. He is a senior member of the Society for Optics and Photonics, the Optical Society of America, and the Laser Institute of America.

Sharon G. Levin

Member

Sharon Levin currently is Emeritus Professor of Economics at the University of Missouri-St. Louis. She joined the department in 1974 and from 1987-1998 served as its chair. Prior to accepting an early retirement in December 2002, she was Professor of Economics, Director of Graduate Studies and co-chair of the department. Dr. Levin's research focuses on factors affecting the productivity, quality and composition of the scientific workforce. Major themes have been the effects on the careers of U.S. scientists and engineers of the diffusion of information technology and immigration. Levin's research has received external support from the Alfred P. Sloan Foundation, the Andrew W. Mellon Foundation, the Exxon Education Foundation, and the National Science Foundation. She has also assisted the National Research Council in the past and has been a member of the Scientific and Engineering Workforce Project sponsored by the National Bureau of Economic Research in conjunction with the Sloan Foundation. She has also served as a consultant to the Howard Hughes Medical Institute on issues concerning scientific productivity over the life cycle. In 1993 she was awarded the Chancellor's Award for Excellence in Research and Creativity by the University of Missouri-St. Louis. Dr. Levin graduated from the Bronx High School of Science, the City College of New York (Phi Beta Kappa) with a B.A. in Economics and earned both her M.A. and Ph.D. in Economics from the University of Michigan. She has published numerous articles in journals including *The American Economic Review*, *Management Science*, *Science*, *The Review of Economics and Statistics*, the *Southern Economic Journal*, and the *Social Studies of Science*. In 1992 Levin co-authored with Paula Stephan, *Striking the Mother Lode in Science*, published by Oxford University Press. This book was reviewed in *Science*, *Chemical and Engineering News*, *Journal of Economic Literature*, the *Southern Economic Journal* and *The Journal of Higher Education*. Her research on the careers of scientists and engineers has also been the focus of articles in *The Economist*, *Science*, *The Scientist* and various newspapers and magazines in the United States and abroad.

Jeffrey L. Ray

Member

Jeffrey Ray is Dean, Engineering Technology and Management, at Southern Polytechnic State University, in Marietta, Georgia. Prior to joining Southern Polytechnic, he served as Director of Grand Valley State University's School of Engineering, in addition to overseeing the interdisciplinary industry-sponsored senior capstone design program. Ray serves on the American Society of Engineering Education's Executive Board as Vice President, Institutional Councils and as Chair of the Engineering Technology Council. Dr. Ray joined the SPSU faculty in August 2007 and holds a doctorate in mechanical engineering from Vanderbilt University. He received a bachelor's and a master's degree in mechanical engineering from Tennessee Technological University. As an educator, Ray likes to draw on his precollege experience as a journeyman industrial electrician and a production troubleshooter. In an era of videos and online learning, Ray believes there is no substitute for a lab where students can hear and see something operate and malfunction, or one for real-world industry-sponsored projects in the classroom. Ray's attention to diversity issues, contacts with the K-12 community, and outreach to minority service organizations has helped SPSU – though not a historically black institution — graduate the most African American males with bachelor's degrees in engineering technology two years running. Ray has been similarly proactive in keeping SPSU's engineering technology programs viable in the face of growing competition for undergraduates. When Georgia allowed an expansion of traditional engineering programs, pulling students away from his school, Ray and his colleagues worked out a statewide 2-plus-2 articulation agreement to admit students from the Technical College System of Georgia. A Tennessee native, Ray spent five years as an electrician before entering Tennessee Technological University and moving from there to Vanderbilt for his Ph.D., conducting research in the mechanical engineering department and the Medical Center's orthopaedics unit.

Michael C. Richey

Member

Dr. Michael Richey is an Associate Technical Fellow currently assigned to support technology and innovation research at The Boeing Company. Michael is responsible for leading a team conducting engineering education research projects that focus on improving the learning experience for students, incumbent engineers and technicians. His research encompasses, Sociotechnical Systems, Learning Curves, and Engineering Education Research. Additional responsibilities include providing business leadership for engineering technical and professional educational programs. This includes development of engineering programs (Certificates and Masters) in advanced aircraft construction, composites structures and product lifecycle management and digital manufacturing. The educational programs are aimed at furthering education in engineering and engineering technology by promoting global excellence in engineering and engineering technology, developing future generations of entrepreneurially-minded engineers. This is achieved by partnering and investing in educational initiatives and programs between industry and institutions of higher learning. Michael has served on various advisory groups including, the editorial board of the Journal of Engineering Education, Boeing Higher Education Integration Board, American Society for Engineering Education Project Board and the National Science Foundation I-UCRC Industry University Collaborative Research Center Advisory Board. Michael has authored or co-authored over 25 publications in leading journals including Science, Journal of Engineering Education and INCOSE addressing topics in large scale system integration, learning sciences and systems engineering. Michael often represents Boeing internationally and domestically as a speaker - presenter and has authored multiple patents on Computer-Aided Design and Computer-Aided Manufacturing, with multiple disclosures focused on system engineering and elegant design. Michael holds a B.A and M.Sc. from ESC Lille in Program Project Management and Ph.D. from SKEMA Business School with a focus on Engineering Education Research.

Melvin Roberts

Member

Melvin L. Roberts is Dean of the Division of Business, Computer and Technical Studies at Camden County College located in Blackwood, New Jersey. Since November 2013 he has also held the post of Dean of Occupational Skills & Customized Training at the college. Prior to his current assignment, he spent 17 combined years as Associate Professor and then Chair of the College's Computer-Integrated Manufacturing Engineering Technology program where he specialized in PLC programming and industrial automation. Since 2007, Dr. Roberts has held the position of Program Chair of the ASEE Two-Year College (TYC) Division and he has been the TYC Division Chair as well since 2009. Dr. Roberts holds the B.S. in Mechanical Engineering cum laude from Howard University, an M.S. in Mechanical Engineering from the Georgia Institute of Technology, and a Doctorate in Educational Leadership from Wilmington University, Delaware. His dissertation used discriminant analysis methods to explore persistence of Engineering Technology students attending a two-year college. Melvin is a Registered Professional Engineer and he enjoys interacting with his students as he continues to teach his PLC programming courses every fall and spring semester.

James R. Stone, III

Member

Dr. James Stone is Director, National Research Center for Career and Technical Education (NRCCTE), and Professor and Distinguished University Scholar, Department of Leadership, Foundations & Human Resource Education, College of Education and Human Development, University of Louisville. NRCCTE is the nation's primary agent for research in the broad field of CTE and a primary source of professional development and technical assistance for CTE professionals, particularly at state and local leadership levels. Dr. Stone's research has focused on strategies that improve the capacity of CTE programs to improve the engagement, achievement, and transition of secondary and postsecondary CTE participants, including longitudinal studies on the effects of work-based learning and the effect of whole-school, CTE-based school reforms on educational outcomes of youth in high-poverty communities. Dr. Stone led an interdisciplinary team in conducting a randomized controlled trial of an innovative pedagogic and professional development strategy to integrate mathematics into high school CTE curricula (Math-in-CTE). A former editor for the Journal of Vocational Education Research, he has published numerous articles, books, and book chapters on CTE. Prior to joining the faculty at the University of Louisville as a Distinguished University Professor in the College of Education and Human Development, Dr. Stone held faculty appointments at the University of Wisconsin-Madison and the University of Minnesota, where he directed the previous NRCCTE (2002-2007). [also, Career and Technical Education]

Will Tyson

Member

Dr. Will Tyson is an Associate Professor of Sociology at the University of South Florida. Dr. Tyson's research focuses on STEM educational and career pathways with a focus on student- and institutional-level influences on high school and college science and math course taking and STEM degree attainment. Dr. Tyson is Principal Investigator of the NSF-funded project "Successful Academic and Employment Pathways in Advanced Technologies" or PathTech (4 years, \$1.2 million). PathTech is a collaboration with Tampa Bay area high schools, community colleges, and local technology and manufacturing industry to better understand pathways from into engineering technology AS degree and certificate programs and back into the local workforce. Dr. Tyson has 10 years of experience as an NSF grantee. He is co-editor of *Becoming an Engineer in Public Universities: Pathways for Women and Minorities* (2010) based on NSF-funded research in colleges of engineering in Florida universities. Dr. Tyson recently served on the editorial board of *Sociology of Education* and has published in and reviewed for several international sociology and education journals.