NATIONAL ACADEMIES Sciences Engineering Medicine

Equitable and Effective Teaching in Undergraduate STEM Education: A Framework for Institutions, Educators and Disciplines

Committee Meeting #5

Division of Behavioral and Social Sciences and Education

Panelist Biographies

Gita Bangera is Senior Vice President at the Northwest Commission for Colleges and Universities. Prior to that she was the first Dean of the Connected Learning Division at Bellevue College. She founded the RISE Learning Institute developing it from concept to successful implementation to bring high impact practices such as Research, Project, and Service based learning to students across all disciplines at Bellevue College. She has also served as the Interim Vice President of Instruction and Acting Co-President of Bellevue College. She is a working group co-lead for the Accelerating Systemic Change Network, and is an Aspen Institute Rising Presidents Fellow. She was the director of the ComGen project that has created a community of practice for Classroom based Undergraduate Research Experiences (CUREs) with faculty from 27 higher education institutions in Washington. She is recognized as a national leader in bringing undergraduate research into the classroom. She received her doctorate in Microbiology at Washington State University, Master's in Biology from Carnegie Mellon University and a Master's in Microbiology from University of Mumbai.

Susan Bickerstaff is a Senior Research Associate at the Community College Research Center (CCRC) of Teachers College3 at Columbia University. She conducts qualitative research on developmental education reform, teaching and learning, faculty learning and engagement, and student experiences at community colleges. Current CCRC projects include Adapting Lesson Study for Community College Mathematics Instruction and the Caring Campus Initiative. Previously, she worked on the Engaging Adjunct Faculty in the Student Success Movement, Scaling Mathematics Pathways, and the CUNY Start projects. Bickerstaff holds a PhD in reading, writing, and literacy from the University of Pennsylvania. Her dissertation focused on the experiences of adolescents at an urban community college. Bickerstaff holds a BA in community health from Brown University and an MS in education from Drexel University.

Danny Caballero is a Professor in the Department of Physics and Astronomy and the Department of Computational Mathematics, Science and Engineering at Michigan State University. He holds the Lappan-Phillips Chair of Physics Education, co-directs the Physics Education Research Lab, serves as a principal investigator for the Learning Machines Lab, conducts research as part of the newly-founded Computational Education Research Lab, and holds an appointment as research faculty at the University of Oslo's Center for Computing in Science Education. Cabellero studies how tools and science practices affect student learning in physics and computational science, and the conditions and environments that support or inhibit this learning. He conducts research from the high school to the upper-division and is particularly interested in how students learn through their use of tools such as mathematics and computing. His work employs cognitive and sociocultural theories of learning and aims to blend

these perspectives to enhance physics and computational science instruction at all levels. His projects range from the fine-grained (e.g., how students engage with particular computational ideas) to the course-scale (e.g., what kind of computing students are able to do after instruction) to the very broad (e.g., how do departments value computation). He earned his B.S. in physics from the University of Texas at Austin in 2004. He worked on opto-microfluidics transport and control experiments at the Georgia Institute of Technology earning his M.S. in physics before shifting his research focus to physics education. He helped found the Georgia Tech Physics Education Research group in 2007 and earned the first physics education focused Ph.D. from Georgia Tech in 2011 working on computational modeling instruction and practice.

Alison Cook-Sather is the Mary Katharine Woodworth Professor of Education at Bryn Mawr College and Director of the Teaching and Learning Institute at Bryn Mawr and Haverford Colleges. She has developed internationally recognized programs that position students and teachers as pedagogical partners, published over 100 articles and book chapters and nine books, spoken or consulted on pedagogical partnership work in 13 countries, and served as a visiting scholar at a number of institutions, including University of Cambridge in England. Alison is founding editor of *Teaching and Learning Together in Higher Education*, founding co-editor of *International Journal for Students as Partners*, reviewer for over 45 journals and book publishers, and the recipient of a number of awards, including the Alumni Excellence in Education Award from the Graduate School of Education at Stanford University.

Steve Dandaneau is Associate Provost at Colorado State University and Executive Director of the Association for Undergraduate Education at Research Universities (UERU). In these roles, Steve provides leadership for an association of U.S. research universities focused on equity/excellence in undergraduate education and collaborates with colleagues to strengthen the undergraduate experience at CSU. Dandaneau previously served as Vice Provost for Undergraduate Studies at Kansas State University; Associate Provost and Director of the Chancellor's Honors and Haslam Scholars Programs at the University of Tennessee, Knoxville; Visiting Professor of Sociology at the University of Maryland, College Park; and Director of the University Honors & John W. Berry Sr. Scholars Programs at the University of Dayton. He earned a B.A. in Economics (with honors) from Michigan State University and an M.A. and a Ph.D. in Sociology from Brandeis University

Jim DeKloe is Distinguished Professor at Solano College and founded the Industrial Biotechnology program of Solano College in the North San Francisco Bay area in 1997. This program emphasizes biomanufacturing by training students to work in companies that have located in the biotech manufacturing cluster in Vacaville, CA. This program was one of the first in the United States designed to teach the skills and knowledge required to go into the manufacturing (rather than research) sector of the biotech industry. Since its founding, this program has served as the model for biomanufacturing programs all around the country. He recently designed a Certificate of Achievement in Cell and Gene Therapy – the first certificate of its kind in the country to focus on this emerging field. He serves as a Board member of the newly formed California Biomanufacturing Center, as a Board member of non-profit Bioprocess2Bioproduct Network, and serves on the advisory committees of multiple college and high school biotechnology programs across the United States.

Adam Fontecchio is a Professor in the Electrical and Computer Engineering Department at Drexel University, and is the inaugural Director of the Center for the Advancement of STEM Teaching and Learning Excellence (CASTLE), and currently serves as National Director for the national Center for Integration of Research, Teaching, and Learning (CIRTL). He has held leadership positions including Vice-Dean of the Graduate College at Drexel University, Vice-Chair of the IEEE Philadelphia Section, and Associate Dean for Academic Affairs in the College

of Engineering at Drexel University. His research focuses on the area of nanophotonics. He has served as PI or Co-PI on >60 funded grants with >$33M in sponsored research or foundation funding, publication of >130 peer-reviewed articles, and 27 patents. These metrics include both technical research and educational research/programs. He is currently PI on an NSF STEM GK12 grant focused on integrating the NAE Grand Challenges into high school curricula, a grant that funds 10 graduate student Fellows each year, and is also PI on a Department of Education GAANN grant. Fontecchio holds a B.A., M.S., and Ph.D in Physics from Brown University.

Francine Glazer (she/her/hers) is the Associate Provost for educational innovation & founding director of the Center for Teaching & Learning at New York Institute of Technology. She is the editor of *Blended Learning: Across the Disciplines, Across the Academy*. Her scholarly interests include faculty mentoring and organizational change. A former president of the POD Network and of the New Jersey Faculty Development Network, she currently serves on the review board of *Innovative Higher Education* and the editorial board of *To Improve the Academy*. Glazer earned her Ph.D. in molecular, cellular, and developmental biology from the University of Colorado, Boulder, and a BS (magna cum laude with thesis honors) from Tufts University. She pursued a post-doctoral fellowship at the University of California, Irvine, under a National Institutes of Health National Research Service Award, and holds a Master Online Teacher certificate from the University of Illinois.

Angela Gunder is the Chief Academic Officer and Vice President of Learning for the Online Learning Consortium (OLC). In this role, she is responsible for gathering, curating, and leveraging the intellectual capital created by and disseminated through OLC. Prior to her position at the OLC, Angela served as the Director of Instructional Design & Curriculum Development for the Office of Digital Learning, managing and mentoring the team that builds the fully-online programs for The University of Arizona. Her over fifteen-year career as a designer for higher education informs her instructional design practice, where she leverages her expertise in web design, usability, visual communication, programming, and standards-based online learning. She is an Associate Editor for the Teacher Education Board of MERLOT, and the recipient of the 2018 MERLOT Distinguished Service Award, the organization's highest honor. She is also the recipient of two Online Learning Consortium Effective Practice Awards for the creation of a framework for personal learning networks, and for the creation of exploratory installations of education technology, respectively. Her research interests include open educational practices, digital literacies, narrative in online course design, and emerging technology for second language acquisition. She holds a B.S. in Computer Science and Fine Art from Fordham University, a M.Ed. in Education Technology from Arizona State University. Angela is also completing her Ph.D. in Teaching, Learning and Sociocultural Studies at The University of Arizona, where in 2020 she was named an Erasmus Scholar by the College of Education for her commitment to the college, the university and to the community.

Muhammad (Mo) Hossain is a technology specialist with over a decade of experience in the Higher Education sector. He has worked closely with technology and academic leaders, gaining valuable insights into the latest technological advancements. Currently, Muhammad is the Director of Instructional Technology at Claflin University, where he oversees the implementation of innovative and emerging technologies in teaching and learning. Muhammad specializes in learning technologies and has been instrumental in the successful implementation of various technological tools at the university. He is also actively involved in training faculty and students on learning technologies, ensuring that technology is used effectively to achieve learning outcomes. Muhammad holds a Master's degree in Networking and Systems

Administration from Rochester Institute of Technology and a Bachelor of Science degree in Management Information Systems from Claflin University.

Nicole LaDue is an Associate Professor in the Department of Earth, Atmosphere and Environment and the Director of the new Transdisciplinary Research Incubator for STEM Education at Northern Illinois University. Her interest in spatial thinking was sparked as a high school earth science teacher. While serving as an Einstein Educator Fellow in the National Science Foundation's Directorate for Geosciences, she discovered discipline-based education research. She uses quantitative and qualitative methods to study 1) the role of spatial thinking in geoscience problem-solving, 2) how to cultivate a sense of belonging for STEM majors, and 3) active learning pedagogies for introductory undergraduate courses. This work is funded through research and scholarship program grants from the National Science Foundation. In 2018 she was awarded the Biggs Earth Science Teaching Award and became a fellow of the Geological Society of America. Dr. LaDue earned an MAT at Cornell University and a PhD in Geological Sciences with a Cognitive Science Specialization from Michigan State University.

Terrell Morton is an Assistant Professor of Identity and Justice in STEM Education at the University of Illinois Chicago. He is an alumnus of North Carolina A&T State University (B.S. Chemistry), University of Miami (MS Neuroscience), and UNC Chapel Hill (Ph.D. Education - Learning Sciences and Psychological Studies). Dr. Morton identifies as a Scholar-Activist! His work strives to transform the positioning and understanding of Blackness in mainstream education, specifically STEM, seeking justice and joy for Black women, Black students, and other minoritized individuals given the social-cultural-political-historical positioning of their identities. He in an accomplished, emerging scholar, having published in an array of academic and lay spaces, given over 50 global and national talks and presentations, and obtained over $13 million dollars in external grants. Through every endeavor, he strives to "walk it like he talks it."

Kelly Neiles is Associate Dean of the Faculty at St. Mary's College of Maryland. Her research in the field of Chemical Education is on how we can intentionally develop and assess scaffolded curricula to increase the inclusive access to STEM disciplines and professions. Her focus is on designing authentic experiences imbedded into coursework so that every student may benefit from them. These experiences better reflect the practice of science by including intensive collaborations and writing exercises. Her research also focuses on understanding how students are interpreting the chemical visualizations that are necessary for deep a understanding of the chemical concepts. She uses eye trackers to monitor students' viewing of these visualizations. She holds a B.S. in Chemistry from South Dakota State University, a M.S. in Forensic Chemistry from George Washington University and a Ph.D. in Chemical Education from Catholic University of America.

Anne-Marie Nuñez PhD is the inaugural Executive Director of the Diana Natalicio Institute for Hispanic Student Success and Distinguished Centennial Professor in Educational Leadership and Foundations at The University of Texas at El Paso. A national expert on Hispanic-Serving Institutions, her book *Hispanic-Serving Institutions: Advancing Research and Transformative Practice*, the first ever to focus on HSIs as organizations, won an International Latino Book Award. In over $15 million of funded projects, she has worked extensively with the Computing Alliance of Hispanic-Serving Institutions (CAHSI), an alliance of over 80 HSIs and other partners, to raise Latinx attainment in computing fields. She also serves as principal investigator of the first ever NSF-funded HSI Center for Evaluation and Research, whose aim is to advance culturally responsive evaluation and research approaches to support HSIs in their efforts to create STEM pathways for diverse students. As a policy-engaged scholar, she also co-authored and disseminated the *National Academies of Sciences, Engineering, and Medicine Committee member report, Minority Serving Institutions: America's Underutilized Resource for*

Strengthening the STEM Workforce. In 2022, she was inducted as an American Educational Research Association Fellow for her sustained contributions to education research. In 2023, she was named in Education Week's Edu-Scholar Public Influence Rankings as among the top 200 scholars in the U.S. influencing educational practice and policy.

Kari O'Connell (she/her/hers) is the Associate Director at the STEM Research Center at Oregon State University. Prior to her current position, she worked in the College of Forestry at Oregon State University in multiple capacities, first as a postdoc studying long-term forest carbon dynamics, next as Director of the H.J. Andrews Experimental Forest where she coordinated the research and education programs, and then with a staff position in Forestry and Natural Resources Extension which focused on professional development for middle and high school teachers. She brings all these experiences together to conduct applied research about equity, access, and inclusion and sense of belonging in undergraduate field education. She was the PI of the Undergraduate Field Experiences Research Network (UFERN), an interdisciplinary network of social and behavioral scientists, discipline-based education researchers, and field educators, that focuses on the development of inclusive, accessible, and effective undergraduate field experiences. She recently lead-authored a Bioscience article that presents a tool for designing and studying holistic, student-centered undergraduate field experiences and has co-led 10+ professional development workshops for faculty based on this work. She received her Ph.D. in forestry from the University of Wisconsin-Madison and her B.A. in Biology and English from Gustavus Adolphus College.

Linda Powell (MD) is Professor and Special Assistant to the Provost and Vice President of Academic and Student Success for STEM Engagement and Outreach. She had served as Department Head of Biology at the Community College of Philadelphia [CCP] for 22 years guiding instruction and Biology offerings to thousands of students. She was the CCP 2006 recipient of the Christian R. and Mary F. Lindback Foundation Award for Distinguished Teaching. She is the CCP Co- Principal Investigator for the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation Grant, funded by the National Science Foundation. She has worked on this initiative for 28 years. CCP works with eight tri-state Colleges and Universities to increase the number of African-American, Latino and Native –American students receiving baccalaureate degrees in the areas of Science, Technology Engineering and Mathematics [STEM]. Dr. Powell received a Citation from the Philadelphia City Council in June of 2015 for her years of STEM student support on the AMP grant and the RISE/MSEIP grant funded by the US Department of Education. Dr. Powell has been on the Board of Directors for the Greater Philadelphia Health Action Inc., a group of federally qualified health centers serving the City of Philadelphia, for 19 years and has served as 1st Vice Chair of the board for 14 years. Dr. Powell has been a member of the NASEM Roundtable for Systemic Change in STEM Education for almost 2 years.

Jon-Marc Rodriguez is currently an Assistant Professor in the Chemistry & Biochemistry Department at UW Milwaukee. He conducts chemistry education research with an emphasis on theory-based qualitative methods. Much of his previous work has focused on how students use equations when solving problems and how students construct and interpret graphs. His research group focuses on chemistry as a community of practice, which involves multiple intersecting communities of bench-top chemists, chemistry education researchers, and instructors. Dr. Rodriguez aims to advance and support the chemistry community, especially individuals at the periphery such as emerging researchers, instructors, and undergraduates interested in participating in science. Dr. Rodriguez earned a B.S. in Pharmacological Chemistry (2014) and an M.S. in Chemistry at UC San Diego (2016), followed by a Ph.D. in Chemistry at Purdue University (2019).

Sarah Rodriguez is an Associate Professor of Engineering Education and an affiliate faculty member with the Higher Education Program at Virginia Tech. In her research, she concentrates on identifying and asking urgent questions about systemic inequities such as racism, sexism, and classism that marginalized communities experience as they transition to and through their engineering and computing higher education experiences. Her strengths include a research-to-practice approach with practitioners, particularly for enhancing outcomes for Latina/o/x students and community colleges. She is a co-editor of the upcoming book, Latin* Students in Engineering: An Intentional Focus on a Growing Population (Rutgers Press, 2024) and author of the upcoming book Developing Engineering and Computing Identity for Latina Students during College (Harvard Education Press, 2025).

Tati Russo-Tait (she/her/hers) is an assistant professor in the cellular biology department at the University of Georgia, where she leads the Advancing Critical Consciousness, Equity, and Social Justice in STEM (ACCESS) Lab. Her lab engages in interdisciplinary and collaborative research projects using critical frameworks and methodologies to examine equity and justice issues in postsecondary biology and STEM education. Her research currently involves several strands: 1) illuminating how hegemonic ideologies inform faculty beliefs and practices, and institutional values, norms, and practices; 2) understanding how to support the critical consciousness raising of current and future STEM faculty and scientists so that they can center equity and justice in their spheres of interest; 3) investigating and highlighting the intersectional experiences of minoritized students in active learning environments; and 4) exploring how to best design and implement science and social justice curriculum and instruction. She received her M.S. in Cell Biology from San Francisco State University, and PhD in STEM Education at the University of Texas at Austin

Amber Simpson (she/her/hers) is an associate professor of mathematics education at Binghamton University. One of her research interests lies in examining individual's identity(ies) in one or more STEM disciplines. More recently, her focus has been on understanding the role of families, and their familial and cultural capital, in shaping students' STEM identity development. This is done through investigating family engagement in and interactions around STEM-related activities in their home environments. Simpson also taught secondary school mathematics for five years before transitioning to training secondary and elementary prospective mathematics teachers. She earned her Ph.D. in mathematics education from Clemson University.

April Strom (she/her) is a mathematics professor at Chandler-Gilbert Community College, one of 10 colleges within the Maricopa Community College District in Arizona where she has taught for over 25 years. April has served as a member of the U.S. National Commission on Mathematics Instruction through the National Academies of Sciences and is currently a member of the Roundtable on Systemic Change in Undergraduate STEM Education. April has served on the Board of Directors for the Mathematical Association of America and the American Mathematical Association of Two-Year Colleges. Strom currently serves as PI for the NSF-funded *Teaching for Prowess* project, which is focused on professional development with community college mathematics faculty on implementing active learning. April co-lead the writing of the Classroom Practices chapter of the MAA *Instructional Practices Guide* and served on the steering committee for the AMATYC *IMPACT* guide. She received her Ph.D. in Curriculum & Instruction (emphasis in Mathematics Education) from Arizona State University, and both her masters and bachelor's degrees in Mathematics from Texas Tech University.

Karen Vignare, Ph.D., M.B.A, is a strategic innovator leveraging emerging technologies to improve access, equitable success, and flexibility within higher education. As Vice President of Digital Transformation for Student Success and Executive Director, for the Personalized Learning Consortium (PLC) at the Association of Public and Land-Grant Universities, Karen

manages a US network of public research universities committed to improving student success equitably focused on enhancing teaching and learning. The PLC is committed to effective use of technology to scale improved learning. She has led several million-dollar adaptive courseware grants providing thought leadership and support to multiple public four-year universities. Karen previously served as a Vice Provost, at University of Maryland University College, the largest online public open access institution where she led innovations in adaptive learning, OER, student success and analytics. She has published extensively on online learning, analytics, and open educational resources.

Greg Walton is an Associate Professor of Psychology at Stanford University. His research investigates psychological processes that contribute to major social problems and how "wise" interventions that target these processes can address such problems and help people flourish, even over long periods of time. • One intervention he developed with Geoff Cohen to bolster students' feelings of social belonging in the transition to college raised the academic achievement of ethnic-minority students over 3 years, and cut by half the achievement gap with white students (for more, see below) • Another developed with Jason Okonofua and Dave Paunesku helped middle school teachers adapt an empathic mindset toward misbehaving students, and cut by half student suspension rates over an academic year. • Other interventions aim to reduce intergroup prejudice, to promote environmental behaviors, to increase voter turnout, and to improve marriages. In all these cases, Dr. Walton focuses on fundamental ways in which people make sense of themselves, other people, and social situations, how meanings people draw can be counterproductive and self-reinforcing (e.g., "People like me don't belong here") and how they can be altered to cause lasting benefits to individuals and to society. Dr. Walton earned his A.B. in Philosophy from Stanford in 2000 and a PhD in Psychology from Yale University in 2005. After graduate school, he worked for a year as a fellow in the Office of Senator Hillary Rodham Clinton and then completed a postdoctoral fellowship at the University of Waterloo before joining the Stanford faculty in 2008.

Sarah Whitley is *Vice President of the Center for First-generation Student Success*. This Center is a an initiative of NASPA–Student Affairs Administrators in Higher Education and The Suder Foundation, since its founding in 2017. Her leadership has positioned the Center as the premier source for data, training, and expertise around first-generation student success and created a network of colleges and universities across the country working to scale and sustain the important work of serving first-generation students.As the leader of the Center, Dr. Whitley has authored several widely-referenced reports on first-generation students, including two acclaimed landscape studies and fact sheets with national data about first-generation students. She also oversaw the creation of the Journal for First-generation Student Success, the first academic peer-reviewed journal with a specific focus on first-generation student experiences and outcomes. Dr. Whitley's work focuses on issues of inequality, academic motivation and decision-making, teaching and learning, the experiences and outcomes of first-generation students, and university presidency and board governance. A proud first-generation college graduate, Dr. Whitley earned a Ph.D. in higher education from the University of Virginia School of Education and Human Development, an M.Ed. in college student personnel administration from James Madison University, and a B.S. in political science from Longwood College. From 2007 - 2013, she served as director of First-Year Experience and Family Programs at Longwood University.