

PreK-12 STEM Education Innovations

Committee

Christine Massey

Chair

CHRISTINE M. MASSEY (CHAIR) is a senior researcher in the Psychology Department at UCLA, where she specializes in linking research in cognitive science to learning in public schools, higher education, and informal education. She has led multiple collaborative projects combining research investigating students' learning and conceptual development in STEM with the development of new curricula, adaptive learning technologies, and educational programs for students and teachers. Prior projects included the development of science curricula and teacher professional development for PreK-Grade 1, robotics programs for girls, and technology-enhanced curriculum for elementary mathematics. Current projects involve basic and applied research using principles of perceptual and adaptive learning to create learning software with applications in STEM and medical education. Dr. Massey was formerly the Director of Research and Education at the University of Pennsylvania's Institute for Research in Cognitive Science and was a member of the national IES Research and Development Center for Cognition and Science Instruction and of MetroMath, an NSF-funded Center for Learning and Teaching. She is an Eisenhower Fellow and was a Fellow in the Spencer Foundation/National Academy of Education's Postdoctoral Fellowship program. Dr. Massey received her B.A. from Wellesley College and her Ph.D. in psychology from the University of Pennsylvania. Her service includes participating in NASEM study committees on Defining Deeper Learning and 21st Century Skills and Designing Citizen Science to Support Science Learning.

Hyman Bass

Member

HYMAN BASS (NAS) is the Samuel Eilenberg Distinguished University Professor of Mathematics and Mathematics Education at the University of Michigan. He came to Michigan from Columbia University in 1999. He has held many visiting appointments, extensively in India and in France. His mathematical work is in algebra, with connections to algebraic geometry, number theory, topology, and geometric group theory. His educational interests include mathematical knowledge for teaching, task design, mathematical practices, and the "mathematical horizons" of school mathematics. He is currently experimenting with instructional designs to help cultivate "connection oriented mathematical thinking." This involves an in-depth study of mathematical structure, and concept formation. He is also developing an undergraduate course on mathematics and social justice. Dr. Bass is a member of the U. S. National Academy of Sciences, the American Academy of Arts and Sciences, the Third World Academy of Sciences, and the National Academy of Education. He is past president of the American Mathematical Society and of the International Commission on Mathematical Instruction. He received the U. S. National Medal of Science in 2007.

Jason T. Black

Member

JASON BLACK is an Associate Professor in Business Information Systems at Florida A&M University where he has created and chaired STEM curriculum and instruction pathways and taught continuously since 1993. Through a grant from the US Department of Education, Black has established long-term relationships with local K-12 schools where he collaborates with teachers to integrate STEM, active learning, and project based learning in their spaces. He currently is the Campus Director of the Blackstone LaunchPad @ FAMU, an Entrepreneurship Network sponsored by the Blackstone Charitable Foundation designed to foster and support entrepreneurship efforts at FAMU and in the community at-large. He is also the Co-Director of the Program of Excellence in STEM (PE-STEM) a multi-million dollar funded academic and research-centered grant focusing on increasing participation and advancement of underrepresented students in STEM areas. Dr. Black also is the co-founder and former Executive Director of the HBCU Data Science Consortium, as well as the Director of the Interdisciplinary Center for Creativity and Innovation, FAMU's entrepreneurship hub. Dr. Black holds a BS degree in Computer Information Systems from Florida A&M University, an MS degree in Computer Science from Georgia Tech, and a PhD in Computer Science from Florida State University.

Tina Cheuk

Member

TINA CHEUK is an Assistant Professor of Elementary Science Education at the California Polytechnic State University – San Luis Obispo where she works to train new teachers and support in-service teachers. She began her career in education as a fifth-grade science teacher in the South Bronx, followed by service as a secondary science teacher as a U.S. Peace Corps volunteer in Ghana, West Africa. Her current research centers on the development of culturally and linguistically diverse learners in science learning settings. Dr. Cheuk has previously served as a committee member in the development of California's Science Curriculum Framework and State Literacy Plan, and the revision of California's Bilingual Authorization Program Standards. Most recently, she is a panel member of the 2028 NAEP Science Assessment Framework Update Steering and Development Committees. Dr. Cheuk is a co-PI of a 5-year U.S. Department of Education Teacher Quality Partnership grant, creating a teacher residency program that expands pathways into special education and bilingual education in partnership with school districts in San Luis Obispo and Santa Barbara County. Dr. Cheuk holds a B.S. in chemistry and biochemistry from the University of Chicago, and a M.A. and Ph.D. in education policy from Stanford University.

Christine M. Cunningham

Member

CHRISTINE CUNNINGHAM is the Senior Vice President of STEM Learning at the Museum of Science in Boston. She aims to make engineering, science, and computational thinking education more equitable and accessible, especially for populations that are underserved and underrepresented in STEM. Her research focuses on articulating frameworks for precollege engineering education and exploring affordances of engineering for learners. Dr. Cunningham is the founding director of Youth Engineering Solutions (YES) and Engineering is Elementary (EiE), which develop equity-oriented, research-based, field-tested STEM curricula and professional learning resources for preK-8 youth and their educators. Under her leadership, these resources have reached more than 25 million youth and 250,000 educators. Previously, she was a Professor of Practice in Education and Engineering at the Pennsylvania State University. Dr. Cunningham serves on a number of advisory boards that currently include the National Assessment Governing Board. She has previously been a committee member of five National Academy Committees, most recently chairing the Inclusive, Diverse, Equitable Engineering for All Committee. She is a fellow of the American Society for Engineering Education and has received numerous awards including the American Society of Engineering Education K-12 and Pre-College Division Lifetime Achievement Award, the IEEE Pre-University Educator Award, and the International Society for Design and Development in Education Prize. In 2017 her work was recognized with the prestigious Harold W. McGraw Jr. Prize in Education. Dr. Cunningham holds joint B.A. and M.A. degrees in biology from Yale University and a Ph.D. in Education from Cornell University.

Ximena Dominguez

Member

XIMENA DOMINGUEZ is currently the Executive Director of Learning Sciences and Early Learning Research at Digital Promise. Across research and development efforts, she and her team aim to make early learning experiences more accessible and equitable for historically excluded young learners by centering families' funds of knowledge. More specifically, her work involves co-designing and evaluating early STEM innovations in partnership with families from historically excluded communities, educators in public early childhood programs, curriculum developers, and educational media designers. In addition to studying how young children's interests, cultural assets, and everyday experiences can be leveraged to meaningfully promote STEM learning across home and school, she and her partners explore when and how STEM domains can be feasibly and meaningfully integrated with each other and with other learning disciplines to promote learning broadly. Across these efforts, she explores the affordances of technology and media for supporting early STEM teaching and learning—documenting how digital tools can be designed to strengthen (not replace) the hands-on, socially rich, and collaborative learning that is key early in childhood. In addition to leading grants from federal agencies and philanthropic organizations, Dr. Dominguez currently leads Digital Promise's strategic effort on multilingual learners. She also serves as ad hoc reviewer for multiple early childhood journals and recently served as a member of the NASEM consensus study, *Science and Engineering in Preschool Through Elementary Grades: The Brilliance of Children and the Strengths of Educators*. Dr. Dominguez has lived in numerous cities across the US, where she has partnered with many Head Start programs and public-school districts. She earned an M.S.Ed. in education from the University of Pennsylvania and a Ph.D. in applied developmental psychology from the University of Miami.

Kara Jackson

Member

KARA JACKSON is a professor of mathematics education at the University of Washington, Seattle. She began her career teaching secondary mathematics in Vanuatu as a Peace Corps volunteer and was a mathematics specialist, supporting both youth and their families, for the Say Yes to Education Foundation in Philadelphia. Dr. Jackson's current research focuses on (1) elaborating critical distinctions in secondary mathematics teachers' perspectives and practices that matter for advancing equity, and (2) investigating and supporting schools and districts to design and implement coherent systems of support that enable teachers to develop ambitious and equitable teaching. Dr. Jackson's scholarship and practice is grounded in long-term partnerships with teachers, coaches, and leaders in schools and districts. Jackson's research has been supported by a National Academy of Education/Spencer Postdoctoral Fellowship, the Spencer Foundation, the National Science Foundation, and the Carnegie Foundation for the Advancement of Teaching. She completed her doctorate in Education, Culture, and Society with an emphasis in mathematics education at the University of Pennsylvania, and her bachelor's degree in mathematics at Bates College.

Amery D. Martinez

Member

AMERY MARTINEZ began his career as an industry professional, working in design and architecture for many years. Through his second career as an educator, he has deep experience with supporting students in their learning, supporting teachers in the classroom, and navigating systems to promote conditions needed for teaching and learning to thrive at the building, district, and state level. He first served as a licensed bilingual educator, next as a instructional technology coach, and then as a district innovation coordinator. Most recently, he served as the K-8 computer science specialist for the New Mexico Public Education Department where he worked on the creation of the state computer science endorsement and competencies. He managed the K-8 computer science grant program based on the NM computer science strategic plan which was designed to support school districts across the state with providing equitable access to computer science education. Mr. Martinez currently works in the Department of Career and College Success supporting and expanding CTE career pathways for Denver Public Schools. He is the lead for the DPS CSforAll Accelerator program, a strategic initiative focused on accelerating high-need communities in their progress towards fundamental standards-aligned computer science education and increased access to interest-driven CS learning opportunities. In addition to his professional expertise, his personal experience as a first-generation college graduate contributes to his equity driven mindset relatable to colleagues and students. Martinez holds a Master's degree in Architecture and Urban Design from UCLA and a bachelor's degree from the University of New Mexico.

Kristen D. McKinney

Member

KRISTEN MCKINNEY currently serves as an Innovation Coach in the Sedalia 200 school district where she focuses on innovation for teaching and learning across content, but with a focus on science, through meaningful, relevant assessment at the high school level. In this role, Ms. McKinney supports teachers through student data meetings, coteaching support, and on-demand instructional modeling. Prior to this role, she served as the Director of Science at the Missouri Department of Elementary and Secondary Education (MO DESE) where she focused on implementation of Science standards based on A Framework for K-12 Science Education and oversaw the development of large scale science assessments designed for these standards within the Missouri Assessment Program. In addition to that role, Ms. McKinney served as co-chair of the Assessing Student Learning Ad Hoc Committee for the Council of State Science Supervisors (CSSS), the Missouri state lead for the Advancing Coherent and Equitable Systems of Science Education (ACESSE) work, and a member of the Short Performance Assessment Learning Community (SPA-LC). As the Director of Science for MO DESE, Ms. McKinney received recognition for the Conservation Intersection Award and the Presidential Citation Award. Finally, she has earned an Education Specialist degree in Educational Technology and Curriculum (2017) from the University of Central Missouri, as well as a Masters in K-12 Building Leadership from Northwest Missouri State University (2020), Masters of Arts in Teaching from the University of Central Missouri (2013) and a Bachelor of Science in Biology with a minor in Chemistry from Missouri Valley College (2010).

Meixi Ng

Member

MEIXI is a Hokchiu former middle school mathematics teacher and current assistant professor in Comparative Education and International Development at the University of Minnesota – Twin Cities. Over the past decade Meixi has collaboratively designed K-12 schools and learning systems alongside district administrators and teacher leaders to restore school-land-community-family relationships and advance collective Indigenous futures in the U.S., Thailand, and Mexico. She brings experience working with both rural school systems with over 33,000 schools and urban school collaboratives. She interweaves Indigenous education with the learning sciences to support curricular STEM innovations that center land and waters through family walks, and school assessments co-designed with family stories and place-based technologies and knowledge systems. Broadly, Meixi studies (1) children's ethical development within micro-moments of interaction in STEM education in relation to teaching and sociopolitical/ecological phenomena and (2) the tensions and possibilities of scaling and innovating schools to become sites of healing, well-being, and regeneration for Indigenous communities and their lands. Meixi is a 2023 NAEEd/Spencer Postdoctoral Fellow and 2020 Presidential Postdoctoral Fellow in American Indian Studies at the University of Minnesota. Meixi earned her Ph.D. in Learning Sciences and Human Development from the University of Washington and her B.S. in Education and Social Policy at Northwestern University.

Thomas T. Peters

Member

THOMAS PETERS serves as Executive Director of South Carolina's Coalition for Mathematics & Science, a STEM Learning Ecosystem Community of Practice that has been in continuous service to the state for 30 years. His professional expertise includes classroom teaching, curriculum design and implementation, teacher professional development, and systemic approaches to educational innovation in STEM. In the last year alone, the SC Coalition for Mathematics & Science worked in 235 schools with over 2,000 teachers to support STEM implementation across rural, suburban, and urban contexts. Dr. Peters is a recipient of the Outstanding Leader in Science Education Award from the National Science Education Leadership Association and the Richard C. Riley Award from the SC Council of Teachers of Mathematics. He holds Doctorate and Master's degrees in Science Education, and Bachelor's degrees in the Teaching of Biology, and in Ecology/Ethology/Evolution, all awarded from the University of Illinois at Urbana-Champaign.

Anthony J. Petrosino, Jr.

Member

ANTHONY PETROSINO serves as the Associate Dean for Research and Outreach in SMU's Simmons School and Professor of the Learning Sciences in the Simmons Department of Teaching and Learning after a long career as a classroom teacher, then as a building administrator, and finally as a district administrator. Dr. Petrosino has received research grants from the National Science Foundation, the Department of Education and the McDonnell Foundation for Cognitive Studies. His current research interests include students understanding of experimentation, teacher education in STEM, and the development of expertise in STEM disciplines. He is Co-Founder of the nationally recognized UTeach Natural Sciences Program where he works with a wide range of both science and math educators. Dr. Petrosino has been an instrumental part of the founding teams of two charter schools—a dual-language school in New Jersey and an elementary school in Boston—as well as a private/public collaborative STEM school in Dallas in partnership with Toyota, SMU, and local community members. He received his Ph.D. at Vanderbilt University where he was a member of the Cognition and Technology Group at Vanderbilt (CTGV) and received his Master's from Teachers College, Columbia University in Educational Administration. Petrosino has been a NASA Space Grant Fellow as well as a McDonnell Post-Doctoral Fellow funded through the Cognitive Studies in Educational Practice Program by McDonnell Douglas. His articles have appeared in the Journal of Science Education and Technology, The Journal of the Learning Sciences, Mathematical Thinking and Learning, Educational Computing Research, The Journal of Engineering Education, and The American Educational Research Journal. Petrosino remains a K-12 all sciences certified teacher in the state of New Jersey and was a Governor's Teacher of the Year award winner while a teacher in the state.

Robert J. Semper

Member

ROBERT SEMPER joined the Exploratorium in 1977 and currently serves as the Chief Learning Officer. Over the years he has had a career developing exhibits and exhibitions onsite and worldwide, creating teacher education programs, producing publications, films, online media and communication programs, expanding the informal science education field and leading major initiatives including the recent relocation of the institution to Pier 15/17. In Dr. Semper's current role, he provides strategy and oversight to the science and education work of the institution and represents the Exploratorium to the broader world of science, science centers and STEM education. Dr. Semper is the author of many journal articles and invited papers and conference talks, and he has been Principal Investigator on over 50 federally and privately funded projects that include developing new online and media resources, experiments using technology to enhance the museum visitor experience, and programs for teachers and museum educators. In 2018, Dr. Semper was selected as a member of the Federal STEM Education Advisory Panel which evaluated and offered guidance on the federal government's Strategic Plan for STEM education. On leave in 1988-89, Dr. Semper was a Schumann fellow at the Harvard Graduate School of Education and director of the creative collaboration between Apple Computer and Lucasfilm Ltd. formed to develop interactive multimedia education projects. Awards include APS Fellow 2019; AAAS Fellow, 2006; and the NSTA 2006 Faraday Science Communicator Award. Before joining the Exploratorium, Dr. Semper taught physics at St. Olaf College and conducted solid state, elementary particle and nuclear physics research at Johns Hopkins University, Lawrence Berkeley National Laboratory and UC San Francisco. He received his Ph.D. in solid-state physics from The Johns Hopkins University in 1973.

Miray Tekkumru-Kisa

Member

MIRAY TEKKUMRU-KISA is a Policy Researcher at the RAND Corporation. Two interrelated foci of Dr. Tekkumru-Kisa's research are (i) understanding and supporting professional learning for science educators, and (ii) measuring and improving instructional quality for ambitious and equitable STEM teaching. Her research efforts center around the design and study of responsive STEM and professional learning environments and involve working in partnership with stakeholders across layers of the education system (e.g., schools, districts, and states) and building the capacity for continuous improvement. In this work, Tekkumru-Kisa engages in research-practice partnerships to engineer change in the classroom as she works to bring successful initiatives to scale. She has led and contributed to federally funded projects involving careful design of educational interventions that address problems of practice and challenges of policy implementation and help to extend theories of teaching and learning. Dr. Tekkumru-Kisa earned her undergraduate and master's degrees in Science and Mathematics Education from Bogazici University in Turkey, and her Ph.D. in Learning Sciences and Policy from University of Pittsburgh. Prior to joining RAND, Dr. Tekkumru-Kisa worked as an Associate Professor of Science Education at Florida State University with appointments across three units: the School of Teacher Education, the Learning Systems Institute, and FSU-Teach Teacher Preparation Program for secondary mathematics and science teachers. Before moving to the United States, she was involved in national and international STEM education improvement projects in Turkey.

Marcelo Aaron Bonilla Worsley

Member

MARCELO WORSLEY is an Associate Professor of Computer Science and Learning Sciences at Northwestern University. His research integrates artificial intelligence and data mining with multimodal interfaces to study and support human learning. He directs the technological innovations for inclusive learning and teaching (tiilt) lab which works with community and industry partners around the world to empower people and organizations through the design and use of equity focused learning tools. These tools include both pedagogical and technological solutions for in school and out of school learning. Dr. Worsley's research has been selected for best paper awards at multiple interdisciplinary research venues. His work has also been recognized through a National Science Foundation CAREER award on bridging sports and computer science. Worsley holds four degrees from Stanford University. These degrees include a Ph.D. in Learning Sciences and Technology Design, an MS in Computer Science, a BS in Chemical Engineering, and a BA in Spanish and Portuguese. He also completed post-doctoral training at the University of Southern California Institute for Creative Technologies.

Amy Stephens

Staff Officer