THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

THE ECOSYSTEM OF SCIENCE COMMUNICATION: COMMUNICATING THE SCIENCE SOLUTION

OCTOBER 21, 2016

#SCIENCESOLUTION

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WELCOME

Welcome to our meeting *The Ecosystem of Science Communication: Communicating the Science Solution*. This meeting, a shift from our normal Washington meeting, is an outgrowth of NCSCE's increasing work on issues of public policy. The shifting political landscape and the upcoming elections have presented us with an opportunity to provide our network with the tools to better understand the conflicts between scientific knowledge and personal or political identity, and how to successfully navigate these issues. This meeting also provides NCSCE with the opportunity to recognize the excellent work being done on college campuses around the United States to better communicate STEM concepts to learners.

We thank our speakers and colleagues who are offering presentations and posters. We invite you to learn more about participants' campus work by reading the poster abstracts included in this program, exploring more information online at www.sencer.net, and talking with any member of the NCSCE staff during or following the meeting.

THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

The National Center for Science and Civic Engagement offers programs, services, and resources to colleges, universities, schools, and community organizations designed to make STEM education real, relevant, rigorous, and responsible, and supports student success and achievement. We invite you to join us in our work.

What improvements in teaching practices and curriculum design will inspire, motivate, and sustain intellectual excellence among our students? How can formal (K-12 and college education) and informal education be integrated in ways that advance the interests of traditionally underserved and underrepresented students? How can students learn from engaging with the great civic challenges of our time? How can new ways of learning improve the human condition?

These questions shape the work and priorities of the National Center for Science and Civic Engagement. Why? Because, as a nation, we can ill afford to lose the benefits that accrue when students achieve high levels of competence in a variety of critical, 21st century skills, especially those developed and nurtured through study in the STEM fields.

Our Center's programs emphasize attention to students not just as candidates for college degrees, but as citizens who contribute to the essential work of creating, applying, and disseminating knowledge — the knowledge we need to make our democracy.

FRIDAY, OCTOBER 21

The American Association for the Advancement of Science
1200 New York Ave NW
Second Floor Meeting Rooms
Washington, DC 20005

7:30 A.M. – 9:00 A.M. **CHECK-IN**

Staff will be outside of the Abelson/Haskins Room on the 2nd floor. At check-in, you will receive your nametag and program materials.

8:00 A.M. – 9:00 A.M. **NETWORKING BREAKFAST**

9:00 A.M. – 9:30 A.M. **WELCOME AND INTRODUCTION**

Eliza Reilly
National Center for Science and Civic Engagement

NCSCE Executive Director Eliza Reilly will provide an overview of the themes and goals for today's meeting.

9:30 A.M. – 11:00 A.M. **HELPING EDUCATORS COMMUNICATE SCIENCE MORE EFFECTIVELY**

Elizabeth Bass
Alan Alda Center for Communicating Science

Why is it important for scientists and science educators to communicate clearly and vividly with people outside their field, and how can they learn to do it better? During the last seven years, the Alan Alda Center for Communicating Science at Stony Brook University has worked with thousands of scientists around the country to address these questions. The Alda Center's approach uses improvisational theater exercises, as well as other techniques, to help scientists at all levels, from students to senior faculty, learn to connect more directly with varied audiences, from students to policymakers to potential funders and collaborators. In this interactive talk, Liz Bass, a science journalist who was the founding director of the Alda Center, will lead the group in some Alda Center exercises and share insights into how educators can talk about their work in ways that non-scientists can appreciate. Come prepared to participate!

11:00 A.M. – 11:30 A.M. **BREAK**

11:30 A.M. – 1:00 P.M. **SCIENCE COMMUNICATION AND INSTITUTIONAL CHANGE**

Tiffany Lohwater
American Association for the Advancement of Science

Tiffany Lohwater, Director of Meetings and Public Engagement and Deputy Chief Communications Officer, will provide an overview of AAAS public engagement efforts, including the newly-formed Leshner Leadership Institute for Public Engagement with Science and the AAAS Leshner Leadership Fellows program, and the Communicating Science program. Tiffany will discuss the Leshner Fellows' science communication and public engagement activities and their plans for institutional change, and provide a preview of challenges faced at their institution and the ways that Leshner Fellows, and AAAS, are working to address them. Tiffany will also share opportunities for involvement with public engagement efforts, including the next cohort of AAAS Leshner Leadership Fellows and Communicating Science workshops for scientists.

1:00 P.M. – 2:00 P.M. **LUNCH**

2:00 P.M. – 3:30 P.M. **COMMUNICATING SCIENCE WITH MEDIA**

Laura Helft
Tangled Bank Studios

Science education often relies on engaging techniques to capture attention and draw audiences. Science media, including films, interactives, and online citizen science projects, have the ability to engage and inform millions of audience members. But how do we know if media projects are achieving their goals, and how can educators best utilize these resources for teaching polarized topics? Laura will describe the work of HHMI's Educational Media group, their public-facing (Tangled Bank Studios) and classroom-oriented (BioInteractive) projects, and the lessons learned about creating effective science media.

3:30 P.M. – 4:00 P.M. **BREAK**

4:00 P.M. – 5:30 P.M. **AMERICA'S TWO 'CLIMATE CHANGES'—AND THEIR SIGNIFICANCE FOR SCIENCE COMMUNICATION**

Dan Kahan
The Cultural Cognition Project at Yale Law School

There are two climate changes in America: the one people "believe" or "disbelieve" in in order to express their cultural identities; and the one people ("believers" and "disbelievers" alike) acquire and use scientific knowledge about in order to make decisions of consequence, individual and collective. Dan will present various forms of empirical evidence—including standardized science literacy tests, lab experiments, and real-world field studies in Southeast Florida—to support the "two climate changes" thesis. Dan will also examine what this position implies about the forms of deliberative engagement necessary to rid the science communication environment of the toxic effects of the first climate change and to make it habitable for enlightened democratic engagement with the second.

5:30 P.M. – 7:30 P.M. **RECEPTION AND POSTER SESSION**

We invite participants to use this time to learn about the work of other attendees. Hors d'oeuvres will be provided.

SPEAKER AND STAFF BIOS

Elizabeth Bass
Director Emerita
Alan Alda Center for Communicating Science
Elizabeth Bass, MPH, is the director emerita of the Alda Center. Starting from its earliest days in 2009, she led development of the Center's workshops, courses, outreach activities and affiliation network. These activities have reached more than 500 science graduate students at Stony Brook University and hundreds of scientists at other institutions around the country.

A longtime journalist, she was science and health editor of Newsday, Long Island's daily newspaper, where she supervised reporting that won the Pulitzer Prize for explanatory journalism, as well as other top science journalism awards. She has taught science and health reporting and news literacy at Stony Brook University, where she developed and initially led the School of Journalism's master's program, which focuses on coverage of health, science, the environment and technology. She also has taught journalism at Hofstra University and at Columbia University's Graduate School of Journalism. She is co-author of two books, *Bioterrorism: A Guide for Hospital Preparedness* and *Kids Health Guide for Parents* and has edited or contributed to several other books about science and health for general readers.

Christine DeCarlo
SENCER and Engaging Mathematics Coordinator, Digital Media Manager
National Center for Science and Civic Engagement
Christine supports SENCER programming and the Engaging Mathematics initiative, and manages NCSCE's digital media. Christine's professional background is in K-12 science education, communication, and assessment. Prior to joining NCSCE, she developed science test questions and instructional materials for Assessment Technology, Incorporated, and taught marine biology courses at Newfound Harbor Marine Institute. Christine graduated from the University of Pittsburgh with a bachelor's degree in biology and a certificate in Latin American studies.

Renée Hanson
Senior Scholar
National Center for Science and Civic Engagement
Renée Hanson earned a master's degree in sociology from the American University in Washington, D.C. and a bachelor's degree from the University of Maryland at College Park. She is currently a PhD candidate in a joint doctoral program at Rutgers University. Her interests are in urban education (pre K to college), race/stratification, health, science, environment, history, and sociology.

Renée has over ten years of professional expertise in education and research as a researcher, consultant, education program coordinator, and teacher. As an Emerging Scholar, Renée was funded by both the Hewlett and MacArthur Foundations for research on K-12 education issues, health, poverty, and other areas concerning minority communities. She was the program coordinator for the American University Ronald E. McNair Scholars program, which recruits low-income and underrepresented undergraduate students at the American University and the University of the District of Columbia in preparation for doctoral study.

Renée has published a dozen articles and reports in the areas of education, sociology, and history. She authored a chapter on child and adolescent health disparities which was featured in the 2011 Allegheny County Population Health in Black and White Report published by the University of Pittsburgh's University Center for Social and Urban Research. She also co-authored a 2009 education report entitled Effective Policies for Promoting Early Behavioral Development that was featured in the Harvard Journal of African American Public Policy published by the Kennedy School of Government.

Renée was invited to chair two 2016 American Educational Research Association (AERA) roundtables and was recently designated a peer reviewer by AERA at their 2016 Annual Meeting. In 2012, she was awarded a doctoral fellowship from Rutgers University-Newark. She also received an award in 2004 for her work in the Ronald E. McNair Post-Baccalaureate Scholars Program at the American University in Washington, DC. Most recently, she served as the Project Coordinator for the National Center for Science and Civic Engagement's New York Project, an initiative supported by the Helmsley Charitable Trust and hosted by the Department of Technology and Society at Stony Brook University.

Laura Helft
Senior Manager for Public Outreach and Evaluation
Tangled Bank Studios
Laura Helft is the Senior Manager for Public Outreach and Evaluation at HHMI Tangled Bank Studios. She works with partner organizations to build the reach and impact of Tangled Bank projects, and also produces websites, short videos, and interactives that bring Tangled Bank film projects to new audiences. Working with Tangled Bank since 2012, she previously served as Senior Researcher for the team, collaborating with scientific advisors and filmmakers to ensure high standards of accuracy and fidelity to the scientific process. Prior to joining HHMI, Helft earned her PhD in Cellular and Molecular Biology at the University of Wisconsin – Madison

Dan Kahan
Elizabeth K. Dollard Professor of Law and Professor of Psychology
Yale Law School
Dan Kahan is the Elizabeth K. Dollard Professor of Law & Professor of Psychology at Yale Law School. His primary research interests are risk perception and science communication. He is a member of the Cultural Cognition Project, an interdisciplinary team of scholars who use empirical methods to examine the impact of group values on perceptions of risk and related facts. In studies funded by the National Science Foundation, his research has investigated public disagreement over climate change, public reactions to emerging technologies, and conflicting public impressions of scientific consensus. Articles featuring the Project's studies have appeared in a variety of peer-reviewed scholarly journals including the Journal of Risk Research, Judgment and Decision Making, Nature Climate Change, Science, and Nature. He is a Senior Fellow at the National Center for Science and Civic Engagement and a member of the American Academy of Arts and Sciences.

Danielle Kraus Tarka
Deputy Executive Director for Operations, Community Outreach, and Engagement
National Center for Science and Civic Engagement
Danielle Kraus Tarka is the deputy executive director for NCSCE. She manages the day-to-day operations of the national office and ensures linkages across NCSCE's initiatives, as well as the websites to support communication and dissemination of resources. She researches new program opportunities, takes part in strategic planning activities, and contributes to grant preparation and management of awarded funds, including sub-grant programs. With Janice Ballou, she co-authored "STEM Practice and Assessment: SENCER's Influence on Educators," a chapter in the ACS Symposium book, Science Education and Civic Engagement: The Next Level (eds. Richard D. Sheardy and Wm. David Burns (2012, ACS). Danielle earned her bachelor's degrees in economics and French from the Pennsylvania State University and completed a nonprofit management executive certificate program at Georgetown University.

Tiffany Lohwater
Director of Meetings and Public Engagement and Deputy Chief Communications Officer
American Association for the Advancement of Science
Tiffany Lohwater is Director of Meetings and Public Engagement and Deputy Chief Communications Officer at AAAS. A science communications and event professional, she is responsible for the AAAS Annual Meeting and the AAAS Center for Public Engagement with Science and Technology. The AAAS Annual Meeting is the predominant international scientific conference for scientists, engineers, policymakers, journalists, and others interested in the intersection of science, technology, and society. Since 2004, the AAAS Center for Public Engagement has worked to further awareness of science and the scientific process and increase public input into scientific research and policy agendas, encouraging and facilitating dialogue between policymakers, the general public, and the scientific community. Lohwater's work encourages scientists to take a more personal and proactive interest in public engagement. She previously worked in research communications and public events at Johns Hopkins University and Rensselaer Polytechnic Institute.

Ellen Mappen
SENCER-ISE Project Director
National Center for Science and Civic Engagement
Ellen is a recognized leader of initiatives to encourage young girls, women, and minorities to pursue science, technology, engineering and math careers. Ellen holds a Ph.D. in History and has written on women's participation in the workforce in late nineteenth and early twentieth century Britain. She was the founder and long-time director of the Douglass Project for Rutgers Women in Math, Science, and Engineering at Rutgers University. Under her leadership, the initiative to encourage girls and women to enter STEM fields received the 1999 National Science Foundation's Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Ellen is also the former director of the Healthcare Services Program at the New Brunswick Health Sciences Technology High School, where she designed projects to encourage students to pursue education in healthcare fields. In sum, she has over 25 years of experience in designing educational programs for girls, young women, and students of color to encourage their participation in STEM fields. As a senior fellow, Ellen helps develop NCSCE initiatives, especially the SENCER project, in high schools around the nation. She also works to develop new opportunities to expand the inclusion of women in the STEM fields.

Eliza J. Reilly
Executive Director
National Center for Science and Civic Engagement
Eliza has two decades of experience in the design and implementation of programs and materials to advance curriculum, academic leadership and faculty development. She has served as the Executive Director of the American Conference of Academic Deans and as a Director of Programs at the Association of American Colleges and Universities, where she was one of the original staff members for the SENCER initiative. In the last decade she has focused on campus-based faculty development and curricular integration through directorships of the Center for Liberal Arts and Society and the Phillips Museum of Art at Franklin & Marshall College, where she also had a faculty appointment in American Studies. Eliza holds a MA in the History of Art and a PhD in American History from Rutgers University. She has been an ongoing participant in SENCER and the National Center's other programs since 2001 and currently serves as the General Editor of the SENCER Models, the co-Editor of the journal, a consultant to Engaging Mathematics, and an advisory board member of SENCER-ISE.

Kyle Simmons
Faculty Development Events Manager
National Center for Science and Civic Engagement
Kyle Simmons is the faculty development events manager for NCSCE, SENCER, and related initiatives. In this role, he plans and manages NCSCE's signature annual events, the SENCER Summer Institute, and the DC Symposium, and provides support for other regional meetings. He also works with regional organizations and initiatives to ensure communication and the sharing of best practices. Kyle brings with him experience from his work with the Junior Statesmen Foundation, where he planned and managed civic education conferences for high school students. Kyle holds a bachelor's degree in political science from Howard University.

Invited Poster Presentations

Engaging Graduate Students and Postdoctoral Researchers in Science Education and Communication

American Association for the Advancement of Science

The NSF-funded project Science in the Classroom (SitC) is a freely available online collection of annotated primary scientific literature from the *Science* family of journals with accompanying teaching materials. The primary goal of SitC is to introduce undergraduate and high school students to cutting edge research in science as a means to teach the nature and process of science. Annotations aid students' understanding of the advanced scientific research in the articles, and accompanying teaching materials and activities provide tools for educators to integrate SitC resources into their lessons. SitC materials are produced by volunteer graduate students and postdocs, and reviewed by the original paper authors for accuracy. Since 2013, SitC has published 80 annotated research papers and accompanying teaching materials and engaged approximately 80 authors and over 90 Contributors.

For Contributors, SitC represents an opportunity to gain experience both in science education and science writing/communication, two career pathways beyond the bench. Contributors also have the opportunity to engage with the original paper's author(s), providing them the chance to collaborate with prominent scientists in their field who they might not otherwise meet. Training is in the form of a series of video modules that introduce the fundamentals of science writing, communication, the modern science education paradigm, and the annotation process. Past Contributors have indicated that they enjoyed the annotation process, and recognize its value as professional development. Moving forward, SitC will continue to increase the number of volunteers who write content and will gather data on the impact of developing a SitC resource on Contributors' development as science, technology, engineering, and mathematics professionals.

Authors: Shelby Lake

Informal STEM Education: Resources and Expertise for Outreach, Engagement and Broader Impacts

Center for Advancement of Informal Science Education (CAISE)

The Center for Advancement of Informal Science Education is an NSF-funded resource center that supports the field of informal STEM learning. CAISE convenes, connects, characterizes, and communicates with the field through the lens of key cross-cutting issues shared by the diverse sectors that comprise the fields of informal STEM education (ISE) and science communication.

Growth in the informal STEM education and science communication fields over the past decade has transformed the landscape of what is available to the STEM research community in terms of resources, potential collaborators and strategies to work with when developing outreach, engagement, and broader impacts activities. CAISE recently released a report, Informal STEM Education: Resources and Expertise for Outreach, Engagement and Broader Impacts, which provides an overview of some of the networks, infrastructure, evidence and expertise that can be leveraged to design and evaluate innovative experiences and settings for audiences of all ages and backgrounds. The report is intended to be a discussion-starter on the existing and potential synergies between informal STEM education, STEM research and science communication.

Authors: Jamie Bell and Grace Troxel

BUILDING RESILIENCY USING NEAR-PEER MENTORS AS COMMUNICATORS OF CLIMATE CHANGE IMPACTS

Cleveland State University, Counterpart International, Hiram College, and Kent State University

The key to this initiative is modeling inquiry-centered discovery learning by older undergraduate near-peer mentors (NPMs) who exude enhanced enthusiasm and understanding of biomonitoring investigations in a climate change resiliency youth outreach education program begun in 2015-16.

The program initiated discovery-learning biomonitoring investigations of coastal communities by the Dominican Environmental Education Program (DEEP) collaborative of seven private English-Language schools. American undergraduates with experience as NPMs joined Dominican undergraduates and young scientists in training sessions in April and August where the Dominicans shared what they had learned about coral and seagrass restoration and mangrove community ecology. The American NPMs shared their knowledge of effective methods of communication, translating biomonitoring investigations into inquiry-based learning experiences through mentoring of both high school student participants and teachers.

The April NPM training program was followed by DEEP day where high school students presented results from their first year of biomonitoring, and where Dominican NPMs modeled careers in marine biology using their own investigations and experiences. The August training program was followed by a two day workshop with teachers, pairing the Dominican NPMs with individual schools where they will mentor student-centered biomonitoring investigations planned for the 2016-17 academic year. The pairing is an outcome of analysis of reflections from all participants indicating a need to link student investigation with NPM models of future careers investigating climate change impacts.

This program is an outcome of the collaboration between Learning Streams International (Hiram College and Kent State University) and the Social Sector Accelerator (Counterpart International) to build a high school biomonitoring protocol investigating coastal community quality, with the long-term goal of increasing resiliency of coastal communities to climate change.

Authors: Brenna Taylor of Cleveland State University
Teresa Crawford and Paul Guggenheim of Counterpart International
Dennis Taylor, Isabella Williams, and Matthew Wright of Hiram College
Kevin Heller, Mary Louise Holly, and Sonya Wisdom of Kent State University

A Peer Investigation: Student Perspective on Civic Engagement Inside and Outside of the Classroom

Kingsborough Community College

This yearlong research looks into how students perceive civic engagement in Human Anatomy and Physiology courses. In order to invoke a sense of self-awareness and responsibility towards the educational process, the study was organized and led by peer investigators. The peer investigators recruited participants from the Anatomy and Physiology courses into focus groups, facilitating discussion of students' experience with the civic engagement component. Qualitative data analysis allowed to identify trends that provided insight into student perspective and attitude towards civic engagement. Based on the identified trends and concerns voiced by students, a survey on civic engagement was created and administered to students at two time points during the semester. Quantitative and qualitative data analysis of the survey data revealed that students overall have positive attitudes towards incorporating civic engagement in the Anatomy and Physiology courses and suggests that civic engagement assignments enhance learning experience, assist with understanding and communicating of scientific information and provide real-life engagement with the subject matter. The study allowed students to gain a clear understanding of how civic engagement affected their learning inside and outside of the classroom. These results can encourage educators and students to learn more about the role of civic engagement in a classroom and in their lives.

Authors: Jonathan Hanna, Kiareixa Perez, and Anna Rozenboym

Exploring the Intersection Between SENCER and the National Science Foundation's Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate) Project

Middle Tennessee State University

During 2015-2016, Middle Tennessee State University (MTSU) faculty and students explored the intersection between SENCER and the National Science Foundation's Interdisciplinary Teaching about Earth for a Sustainable Future (InTeGrate) project. The principal mechanisms for SENCER involvement were (1) participation of Judith Iriarte-Gross, a MTSU faculty member who has been teaching SENCER courses since 2005, and (2) use of the SENCER course rubric to characterize a general studies introductory Earth Science course and an upper-level Political Science course.

A prominent outcome of combining SENCER with InTeGrate was the addition of service learning to Abolins' introductory Earth Science course. Addition of service learning is attributable to SENCER because service learning is in the SENCER rubric, but service learning is not inherent to the InTeGrate "Environmental Justice and Freshwater Resources" education module. To add service learning, Abolins partnered with the MTSU Stormwater Program to hold two 50-minute campus clean ups. Other prominent project outcomes are not directly attributable to SENCER, but these outcomes are consistent with the goals of both SENCER and InTeGrate. For example, the InTeGrate "Map Your Hazards" education module appears to have stimulated so much interest in natural hazard education that two of the 17 undergraduates in Iriarte-Gross's Honors Physical Science class are going to make related presentations at the Tennessee Academy of Sciences meeting in November 2016. Also, use of the InTeGrate "Humans' Dependence on Earth's Mineral Resources" module added Earth Science knowledge to the exploration of mining policy in Langenbach's American Public Policy class, and this constituted the first use of a two-week natural science module in a non-geography MTSU social science class.

Authors: Mark Abolins, Judith Iriarte-Gross, and Lisa Langenbach

COMMUNICATING STEM TO EDUCATORS AND STUDENTS IN INFORMAL SETTINGS USING A NAVAL-RELEVANT MESSAGE

United States Naval Academy

Implicit and explicit communication challenges exist for military institutions offering STEM education outreach to K-12 students and teachers in informal settings. Undergraduate students, or midshipmen, at the United States Naval Academy (USNA) facilitate STEM outreach events for K-12 students and teachers around the country through USNA's STEM Center for Education and Outreach. They are also officers in training for the military. Some outreach audiences may be wary of military facilitators and what they think they represent. To mitigate communication challenges, midshipmen facilitators dress in a civilian-like uniform during outreach events, explain STEM concepts using layperson terms, and relate STEM content to the military's humanitarian response, advancement of technological development, promotion of critical thinking skills, and efficient use of resources. The mission of the USNA STEM Center is to promote STEM careers, not to explicitly recruit K-12 students into the military, which may be a mistaken assumption among some audiences. To rectify this, midshipmen facilitators communicate the importance of STEM to society. They do so using by showcasing Naval-relevant applications with each hands-on activity in order for students and teachers to learn real world, national security STEM connections; thereby spreading the message that military technological innovation has beneficial applications well beyond military defense.

Authors: Dante Daniels, Jennifer da Rosa, Sarah Durkin, Rachel Hetlyn, Angela Leimkuhler Moran, and Courtney Mason

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