

THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

**WASHINGTON SYMPOSIUM
AND
CAPITOL HILL POSTER SESSION**

SEPTEMBER 28-30, 2014

#DC14NCSCE

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DIRECTIONS TO WASHINGTON SYMPOSIUM VENUES

SEPTEMBER 29: AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

9:00 a.m. – 5:00 p.m.

Auditorium

Metro: Metro Center station, Red, Orange and Blue lines

The entrance to the building is located at the intersection of 12th and H Streets Northwest. Security will direct you to the right, where you will see the registration and check-in area where NCSCE staff will be available. The auditorium is just up the stairs from registration.

SEPTEMBER 30: CAPITOL HILL POSTER SESSION

12:00 p.m. – 2:30 p.m.

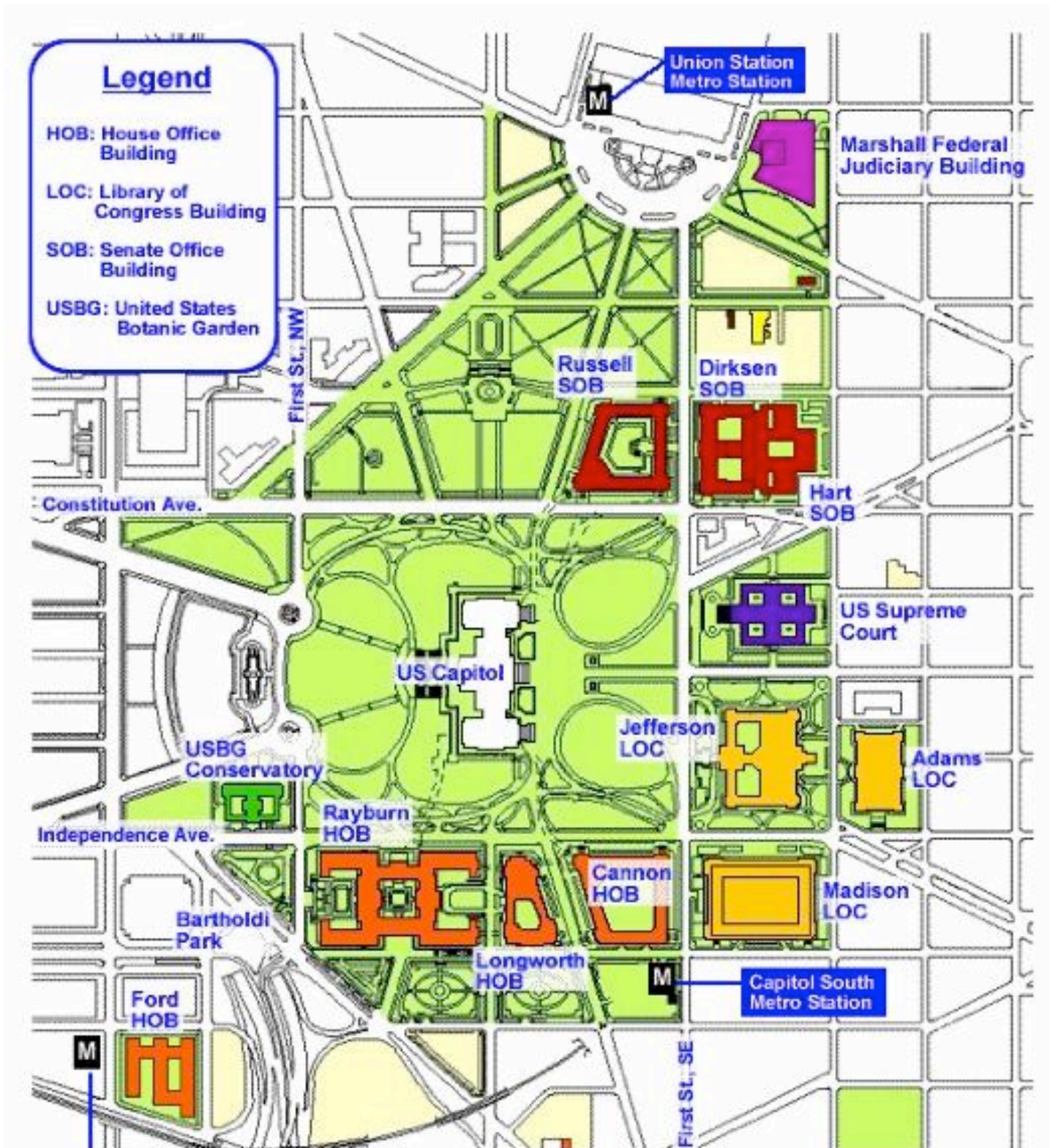
Cannon Caucus Room

Metro: Capitol South station, Orange and Blue lines

The Cannon House Office Building will be straight ahead as you exit the Capitol South Metro Station. Entrances are located on First Street, SE and Independence Avenue.

Please arrive at the Cannon Caucus room between **11:00 a.m. - 11:45 a.m.** to set up your poster, and allow 10-15 minutes to go through security at the building entrance. NCSCE staff will provide pins and clips for poster hanging. The session and reception will conclude at 2:30 p.m.

CAPITOL COMPLEX MAP



WELCOME

Welcome to the 2014 National Center for Science and Civic Engagement Washington Symposium and Capitol Hill Poster Session. This annual symposium provides NCSCE with the opportunity to recognize the excellent work being done on college campuses around the United States to improve science, technology, engineering, and mathematics education by linking course content to real world applications.

We thank our distinguished plenary speakers and colleagues who are offering presentations and posters. We wish to especially acknowledge Jessica Wyndham, our host at the American Association for the Advancement of Science, and the Honorable Rush Holt, member of Congress, our host and sponsor for our Capitol Hill program.

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 contacting any member of the NCSCE staff during or following the Symposium.

THE NATIONAL CENTER FOR SCIENCE AND CIVIC ENGAGEMENT

The National Center for Science and Civic Engagement offers programs, services, and assets to colleges, universities, schools, and community organizations designed to make STEM education real, relevant, rigorous, and responsible, and support 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 under-engaged 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 and their connected civic goals 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.

SUNDAY, SEPTEMBER 28

*National Postal Museum, Byrne Education Loft and Discovery Center
2 Massachusetts Avenue NE
Washington, DC 20002*

12:00 P.M. – 1:00 P.M.

LUNCH AND REGISTRATION

Staff will be in overlook area of the Byrne Education Loft for registration and lunch. The overlook is located on the mezzanine level of the National Postal Museum, one floor above the first street entrance, which is adjacent to Washington DC's Union Station train and Metro station.

1:00 P.M. – 1:30 P.M.

WELCOME TO THE 2014 NCSCE WASHINGTON SYMPOSIUM

Wm. David Burns
Executive Director
National Center for Science and Civic Engagement

David will provide an overview of the themes and goals for the 2014 Washington Symposium program.

1:30 P.M. – 2:15 P.M.

PLENARY PRESENTATION: THE CHALLENGE OF SCIENCE COMMUNICATION

Dan Kahan
Elizabeth K. Dollard Professor of Law; Professor of Psychology; Director of the Cultural Cognition Project
Yale University

Conventional wisdom suggests that the cause of public polarization around many policy questions that involve science is a lack of knowledge, or insufficient “scientific literacy.” Dan will help us consider some alternative explanations for these divisions that are based on how science is communicated. What can we do to mitigate the cognitive “pollution” that clouds the intersections of science, science education, and public policy?

2:15 P.M. – 2:30 P.M.

BREAK

2:30 P.M. – 3:15 P.M.

PLENARY PRESENTATION: THE EVIDENCE ON EVIDENCE

Andrew Gelman
Professor of Statistics and Political Science; Director of the Applied Statistics Center
Columbia University

In the context of advocacy for, as well as skepticism about, the efficacy of many publicly-supported programs, there is much talk about the need for “evidence-based” or “proven” strategies when proposing interventions, regulations, and other species of public policy. Andrew will help us examine just what constitutes “evidence” or proof in today’s policy context as he explores the evidence on how evidence is actually used.

3:15 P.M. – 3:45 P.M.

**PANEL DISCUSSION: INTERSECTIONS—WHERE EVIDENCE, SCIENCE, AND SCIENCE
COMMUNICATION MEET EACH OTHER IN COLLEGE AND THE LARGER PUBLIC SPHERE**

Andrew Gelman, *Columbia University*

Dan Kahan, *Yale University*

Moderated by Janice Ballou, *National Center for Science and Civic Engagement*

This panel discussion will enable the afternoon's plenary speakers, and all participants in the Symposium, to engage in a discussion that bridges the themes of the presentations.

3:45 P.M. – 4:15 P.M.

**FIELD REPORT: TAKING THE CHALLENGES OF EVIDENCE AND SCIENCE
COMMUNICATION INTO THE COLLEGE CLASSROOM**

Mary Nucci

Research Assistant Professor, Human Ecology

Rutgers University

Sharing results of a four-year effort to improve pedagogy in science communication by incorporating human studies research on perceptions of climate change, Mary will describe how student teams followed a canonical research process, using their fellow students as research subjects. During this process, students acquired a deeper understanding of the critical role that evidence plays in decision making and gained confidence in using evidence to challenge anecdotal wisdom.

4:15 P.M. – 4:30 P.M.

TOMORROW'S PROGRAM — A LOOK AHEAD

Wm. David Burns

Executive Director

National Center for Science and Civic Engagement

David will close the day's program with brief reflections on what we have learned so far, followed by a description of the themes for Monday's program and how they relate to the work of SENCER and the National Center.

4:30 P.M. – 5:30 P.M.

RECEPTION, NATIONAL POSTAL MUSEUM BYRNE EDUCATION LOFT

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

MONDAY, SEPTEMBER 29

*American Association for the Advancement of Science, Auditorium
1200 New York Ave NW
Washington, DC 20005*

9:00 A.M. – 9:15 A.M.

REGISTRATION AND BREAKFAST

9:15 A.M. – 9:30 A.M.

WELCOME AND GOALS FOR THE DAY

Cathy Middlecamp

Professor at the Nelson Institute for Environmental Studies; Howe Bascom Professor in the Integrated Liberal Studies Program, SENCER Co-PI

University of Wisconsin-Madison

In the context of explaining the SENCER approach, Cathy will outline the themes and goals for the panels, presentations, and field reports in today's program.

9:30 A.M. – 10:30 A.M.

PLENARY PRESENTATION: "TO CLAIM A RIGHT, YOU HAVE TO KNOW WHAT YOU HAVE A RIGHT TO" — NEW RATIONALES FOR IMPROVING SCIENCE TEACHING AND SCIENCE COMMUNICATION

Jessica Wyndham

Associate Director, Scientific Responsibility, Human Rights and Law Program

American Association for the Advancement of Science

Article 15 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) requires nations to "recognize the right of everyone to enjoy the benefits of scientific progress and its applications." In the context of some of the most difficult issues facing our world today (from outbreaks of new diseases to unspeakable assaults on human dignity), Jessica will help us understand what this right means, where it came from, and what it implies about our obligations as scientists, scholars, educators and citizens. Does having this right offer us a new imperative, a new rationale, and even suggest a new approach, for improving STEM education and science communication? Following Jessica's presentation, Cathy will invite participants to pose questions, share their reactions, and suggest new strategies.

10:30 A.M. – 10:40 A.M.

BREAK

10:40 A.M. – 11:40 A.M.

**PRACTITIONER PANEL: IMPROVING STEM CLASSROOMS OF THE FUTURE BY
ENGAGING PRE-SERVICE TEACHERS**

Sarah Haines
Professor, Biology and Science Education
Towson University

Kim Brown
Associate Professor and Education department Chairperson
University of North Carolina at Asheville

This panel of SENCER practitioners will discuss their work on engaging pre-service teachers. Sarah will describe new approaches being employed in the Towson University teacher education program. Kim will review her work with elementary school pre-service teachers on effective STEM teaching methodologies. Cathy will facilitate an exchange among the panelists and participant Q&A.

11:40 A.M. – 12:10 P.M.

FIELD REPORT: STIMULATING MORAL, ETHICAL, AND CIVIC ENGAGEMENT

Robert Franco
Professor of Ecological Anthropology; Director of Planning, Research, Grants
Kapi'olani Community College, University of Hawaii

This field report will brief participants on the Teagle Foundation-funded project “Student Learning for Civic Capacity: Stimulating Moral, Ethical, and Civic Engagement for Learning that Lasts.” The report will build on Kapi'olani Community College’s experience in integrating a commitment to civic and moral responsibility for diverse, equitable, healthy, and sustainable communities into service-learning and sustainability designated courses. Bob will conclude by offering his suggestions on how to bring the benefits of this work to other campuses and settings.

12:10 P.M. – 1:00 P.M.

LUNCH

1:00 P.M. – 1:10 P.M.

AFTERNOON SESSIONS — MOVING BEYOND THE COLLEGE CLASSROOM

Eliza Reilly
Director of Programs
National Center for Science and Civic Engagement

Eliza, who will serve as moderator for the afternoon programs, will describe how the panel presentations illustrate new ways of thinking about science and civic engagement and new directions for the National Center’s programming.

1:10 P.M. – 2:00 P.M.

**PANEL DISCUSSION: EFFECTIVE INFORMAL AND FORMAL EDUCATION PROGRAMS
— STUDENTS DISCOVER COLLABORATION: REAL SCIENCE, REAL MUSEUM, REAL
WORLD**

Dayson Paison

Kenan Fellow

Alamance-Burlington School System

Elizabeth Baird

Director of Education

North Carolina Museum of Natural Sciences

Christy Flint

Coordinator of the MicroWorld Investigate Lab

North Carolina Museum of Natural Sciences

Stephanie Schuttler

Postdoctoral Scientist in the Biodiversity Laboratory

North Carolina Museum of Natural Sciences

Malinda Faber

Research Associate at the William and Ida Friday Institute for Educational Innovation

North Carolina State University

Kelsie Armentrout

Kenan Fellow

Wake County Public Schools

Elizabeth represents an interdisciplinary group of collaborators working on the [Students Discover Project](#). This NSF-funded initiative uses the pathway of museum-based “citizen science” to engage students, teachers, and the visiting museum public in research that can be developed into curricular modules to improve STEM education in middle schools. Our panelists will report on three phases of the project’s work: creating modules for middle school citizen scientists to participate in museum laboratory-based research; testing modules with museum visitors in a hands-on laboratory space; and scaling modules to diverse middle school classrooms and extending them to life long learners using web-based and social media platforms. Eliza will welcome questions and comments from attendees.

2:00 P.M. – 3:15 P.M.

**PANEL PRESENTATION: EMPOWERING STUDENTS TO TRANSFER LEARNING TO LIFE
BEYOND THE CLASSROOM**

David McMullen

Assistant Professor, Interdisciplinary Department of Arts and Sciences

City College of New York

Cassandra Clevenger

Jeshua Zeglen

GLISTEN Undergraduate Stewardship Liaisons

Kent State University

Fay Hansen

Associate Professor, Biological Sciences

Oakland University

This panel will feature participants who are empowering students to engage in their communities. David will describe the work of the CCNY Department of Continuing Worker Education in helping students advocate for action on their student and medical issues. GLISTEN Undergraduate Stewardship Liaisons Cassandra and Jeshua will discuss their work with the Portage County Park District and how it engaged other students. Fay will discuss the impacts of Oakland University's capstone biology course on food on students. Eliza will invite the panelists to comment on one another's presentations and welcome questions and comments from participants.

3:15 P.M. – 3:30 P.M.

BREAK

3:30 P.M. – 4:00 P.M.

**FIELD REPORT: BUILDING INTERNATIONAL COLLABORATIONS AROUND ISSUES OF
COMMON IMPORTANCE**

James Bader

Executive Director, Leonard Gelfand STEM Center

Case Western Reserve University

Courtney Freyhauf

Robin Singleton

Ryan Zittel

Students

Hiram College

Dennis Taylor

Professor of Biology

Hiram College

The 2014 Igniting Streams of Learning in Science (ISLS) STEM Academy pilot program engaged American urban inner city public school students with Pakistani private school students. This collaboration, which gave voice to underrepresented groups, focused the process of scientific and other inquiry on meaningful questions identified by students themselves. Dennis will report on how this integration of SENCER-inspired methodologies and transnational communication technologies was embraced by the students involved.

4:00 P.M. – 5:00 P.M.

**CONCURRENT SESSION A: WORKING WITH YOUR MEMBERS OF CONGRESS AND
THEIR OFFICES - AAAS AUDITORIUM**

Joanne Padrón Carney
Director for Government Relations
American Association for the Advancement of Science

Designed as an orientation program and “primer” for participants who plan to meet with members of their Congressional delegations on Tuesday, September 30th, Joanne will provide participants with advice on working with Congressional offices, including ways to share with them the good work conducted on your campus, not only while you are in Washington, but after you return home.

4:00 P.M. – 5:00 P.M.

**CONCURRENT SESSION B: WORKING WITH THE NATIONAL CENTER AND SENCER -
REVELLE CONFERENCE ROOM**

The National Center leadership will welcome participants who want to learn more about our programs and resources and explore opportunities for collaborative work. A very brief overview of the Center’s work will be presented followed by informal discussions with Center staff.

TUESDAY, SEPTEMBER 30

*Cannon House Office Building, Caucus Room
United States Capitol
Washington, DC 20515*

9:00 A.M. – 11:30 A.M.

PRESENTER MEETINGS WITH CONGRESSIONAL DELEGATIONS

Staff will be on hand in the Cannon Caucus Room to help with poster set-up starting at 11:00 a.m.

12:00 P.M. – 2:30 P.M.

POSTER SESSION AND LUNCHEON RECEPTION

12:30 P.M.

PRESENTATION OF THE 2014 WILLIAM E. BENNETT AWARDEES

David Burns, presiding

**DR. GARY BOOTH of Brigham Young University
THE CORE INTERDISCIPLINARY TEAM OF THE UNITED STATES MILITARY ACADEMY AT WEST POINT
THE HONORABLE RUSH HOLT of the 12th District of New Jersey**

Remarks

The Honorable Rush Holt
United States House of Representatives

Dr. William E. Bennett
National Center for Science and Civic Engagement

2:30 P.M.

SYMPOSIUM ADJOURNS

SYMPOSIUM SPEAKERS AND STAFF

Ms. Kelsie Armentrout

Kenan Fellow

Wake County Public Schools

Kelsie Armentrout is a Kenan Fellow working on the eMammal Project. In this role, she has taken her expertise from the middle school science classroom to collaborate with researchers and teachers in North Carolina to develop a student-driven, scalable citizen science curriculum. Kelsie is developing lessons that will connect schools internationally as they look at eMammal data from the United States, India, and Mexico. She is the science department chair at Hilburn Academy, a STEM school located in Raleigh, NC, where she teaches both sixth and eighth grade science. Kelsie holds a Bachelor's degree in Elementary Education from University of North Carolina at Greensboro and her NC Environmental Education Certification from the office of NCEE.

Mr. James Bader

Executive Director, Leonard Gelfand STEM Center

Case Western Reserve University

Jim Bader is the executive director of the Leonard Gelfand STEM Center and adjunct lecturer in the department of biology at Case Western Reserve University. Through the work of the Center, he draws upon the expertise of faculty, staff, and students in the College of Arts and Sciences and the Case School of Engineering to design and implement exemplary and high impact precollege STEM initiatives that increase the number and diversity of students pursuing study in the STEM disciplines at Case Western Reserve University and elsewhere. He serves as a primary resource for faculty and other internal constituents on precollege STEM programming and is the key point of contact for partnership with external constituents interested in precollege STEM expertise and programs at CWRU. He has been recognized for his undergraduate teaching on several occasions and is the 2011 recipient of the J. Bruce Jackson, M.D. Award for Excellence in Undergraduate Mentoring. Jim holds a Bachelor's in Biology from the University of Notre Dame and an Master's in Biology from Case Western Reserve University.

Ms. Elizabeth Denton Baird

Director of Education

North Carolina Museum of Natural Sciences

As director of education at the North Carolina Museum of Natural Sciences, Liz Baird is accustomed to sharing science with students, teachers, and the general public across the state and around the world. Liz and her staff deliver programs at the Museum, on school grounds and in the field. This includes opportunities to participate in deep sea research, to lead professional development for teachers in the tropics and to design activities to reconnect children and nature. As part of the collaborative Students Discover project, Liz and the Museum support teachers in their research experience and curriculum design and implementation. The 2010 recipient of the Environmental Educator of the year from the Environmental Educators of North Carolina, she has a Bachelor's in Biology from Salem College and a Master's in Science Education from North Carolina State University.

Ms. Janice Ballou

Evaluator

National Center for Science and Civic Engagement

Janice Ballou is a nationally recognized survey research methodologist with more than 40 years of experience. Currently an independent consultant; before retirement she was a vice president and Senior Fellow at Mathematica Policy Research, Inc. Her prior position was director of the Rutgers University Center for Public Interest Polling. Her

publications include “Survey Data Collection Methods” a chapter in *Counting Working-Age People with Disabilities: What Current Data Tell Us and Options for Improvement*; “Web of Caring: Development of Web-Survey Best Practices” and “Diversity of Methods: Assessment of Quantitative and Qualitative Research Multiplier Effect” in *Proceedings of the American Statistical Association Section on Survey Research Methods*; “Ensuring PhD Development of Responsible Conduct of Research: Who’s Responsible?” (co-author) in *Science and Engineering Ethics*. She has held multiple elected offices in the American Association for Public Opinion Research and served on the *Public Opinion Quarterly* Advisory Committee and the *Survey Practice* Editorial Board.

Dr. Kim Brown

***Associate Professor and Department of Education Chairperson
University of North Carolina at Asheville***

Kim Brown is an associate professor and the chairperson of the Education department at the University of North Carolina Asheville. Kim teaches numerous licensure courses, including Inquiry-Based Science Instruction for candidates seeking elementary licensure. For her curricular and service work in this course, Kim was named a University SENCER Fellow. Kim has been very involved in work related to the University of North Carolina Asheville's liberal arts model, serving as the chairperson of the university's Integrative Liberal Studies Oversight Committee and the university's representative on the state-level General Education Council. Kim was the university's recipient of the 2014 Distinguished Service Award.

Prior to joining the University of North Carolina Asheville faculty in 2005, Kim worked as a teacher, school level administrator, and central office administrator with Transylvania County, NC schools for 10 years in a variety of positions at all school levels. Kim holds a Doctorate in Education from Western Carolina University; a Master's in School Administration from Western Carolina University; a Bachelor's in Psychology from the University of North Carolina Asheville; and North Carolina Highly Qualified Teaching Licenses in the areas of Elementary Education (Grades K-6), Special Education: General Curriculum (Grades K-12), Birth through Kindergarten, Reading (Grades K-12), Curriculum Instructional Specialist, Principal (Grades K-12), and Superintendent. Kim is particularly interested in assessment, accountability and gender differences in learning, and B-12 curriculum with science education as a specialty.

Mr. Wm. David Burns

***Executive Director
National Center for Science and Civic Engagement***

Wm. David Burns is the executive director of the National Center for Science and Civic Engagement, co-founder and principal investigator of SENCER, publisher of *Science Education and Civic Engagement - An International Journal*, and professor of general studies at Harrisburg University of Science and Technology. He also serves as principal investigator for the National Center's Great Lakes Stewardship Through Education Network (GLISTEN) project, Science and Civic Engagement: Western Network (SCEWestNet), SENCER-ISE, an initiative to connect formal science education at the college level with informal science educators (museums, aquaria, science journalists, etc.), and Engaging Mathematics, an initiative which applies the SENCER method to college-level mathematics courses, with the goal of using civic issues to make math more relevant to students.

Prior to establishing the National Center, David served as senior policy director for the Association of American Colleges and Universities (AAC&U). During his nine years with AAC&U, he established the Center for Disease Control and Prevention-sponsored Program for Health and Higher Education and created the Summer Symposia dedicated to exploring the power that students have to improve the health of colleges and communities. For 23 years, David was a member of the administration of Rutgers, the State University of New Jersey. David is the principal author and editor of the book, *Learning for Our Common Health*, and, among other publications, the article, "Knowledge to Make Our

Democracy." In 2008, the American Society for Cell Biology honored David and SENCER co-founder Karen Kashmanian Oates with the Bruce Alberts Award for Excellence in Science Education. David's undergraduate and graduate work (at Rutgers) was in political science with a concentration on political theory. He was a Woodrow Wilson National Fellow.

Ms. Joanne Padrón Carney

Director for Government Relations

American Association for the Advancement of Science

Joanne Padrón Carney is the director of government relations for the American Association for the Advancement of Science (AAAS). Since 1997, she has managed all activities of the program, including production of the newsletter Science and Technology in Congress; tracking legislation related to a wide range of policy issues that impact the research community; organizing workshops and briefings for congressional leaders and their staff; and formulating AAAS policy strategies, statements and testimony. She also serves on the Advisory Committee of the House Research & Development Caucus. Ms. Carney contributes to the annual AAAS Intersociety Working Group R&D Report.

Prior to joining the AAAS staff, Joanne headed the Government Relations Office for the American Institute of Aeronautics and Astronautics (AIAA) where she followed civil space, civil aeronautics and defense issues for almost ten years. At AIAA Ms. Carney was staff liaison to the AIAA Public Policy Committee, and assisted in the organization of over 16 technical workshops and the preparation of numerous position papers.

Ms. Carney holds a Bachelor of Arts in Spanish Language and Literature from the University of Maryland at College Park and a Master of Arts in Science, Technology, and Public Policy from the Elliott School of International Affairs at George Washington University.

Ms. Hailey Chenevert

Program Coordinator, SENCER-ISE

National Center for Science and Civic Engagement

Hailey Chenevert is the program coordinator for the SENCER-ISE initiative. In this capacity, she serves as part of the project leadership team, takes part in the review and distribution of partnership awards, liaisons with the Koshland Museum of Science, and supports developing partnerships. Hailey brings experience in the informal education field from previous work with the Smithsonian Center for Folklife and Cultural Heritage. While at the Smithsonian, she worked with over 25 universities, the USDA, and the Association of Public and Land-grant Universities to create *Campus and Community: Public and Land-Grant Universities and the USDA at 150*, a program for the 2012 Smithsonian Folklife Festival. Hailey holds a Bachelor's degree from Michigan State University, as well as a specialization in Museum Studies.

Ms. Cassandra Clevenger

GLISTEN Undergraduate Stewardship Liaison

Kent State University

Cassandra Clevenger is a GLISTEN undergraduate stewardship liaison at Kent State University. In this position, she works to enhance service learning opportunities in STEM coursework for students at the university by providing a bridge between students, faculty, and community affiliates. In her spare time she volunteers with The Nature Conservancy and other organizations, working to remove invasive plant species throughout Northeast Ohio and enhance natural landscapes. She also works closely with Kent State University's Urban Forestry program as a Geographic Information Systems Specialist. Cassandra is currently working towards a Bachelor's of Science in Conservation Biology.

Ms. Christine DeCarlo

Program Assistant, Engaging Mathematics and SENCER

National Center for Science and Civic Engagement

Christine Marie DeCarlo supports SENCER programming and the new Engaging Mathematics initiative. 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.

Ms. Malinda Faber

Research Associate

Friday Institute for Educational Innovation, North Carolina State University

Malinda Faber is a research associate at The Friday Institute for Educational Innovation at the NC State University College of Education. She leads multiple K-12 STEM education evaluations, including The Golden LEAF Foundation's statewide STEM Education Initiative and an evaluation of The Kenan Fellows Program, which provides industry and research internships for K-12 teachers in North Carolina. Malinda also works on research projects studying the scaling of citizen science projects in formal education settings, workforce development indicators for community colleges, and the creation of a statewide K-12 digital learning plan for North Carolina.

Ms. Christy Flint

Coordinator of the MicroWorld Investigate Lab

North Carolina Museum of Natural Sciences

Christy has over 20 years of experience in teaching natural and life science topics to a wide range of audiences, from preschoolers to adult learners. As an educator at the North Carolina Museum of Natural Sciences, Christy has developed numerous hands-on programs correlated to the K-12 science curriculum of North Carolina and has presented these programs to thousands of students. In 2012 she became the coordinator of the Micro World Investigate Lab, one of three hands-on educational labs in the Museum's Nature Research Center. As the coordinator of this lab, Christy utilizes her background in the life sciences and secondary science education to develop activities and classes which allow the general public and upper elementary- through high school-aged students to explore scientific concepts using state-of-the-art research equipment.

Dr. Robert Franco

Professor of Ecological Anthropology, Director of Planning, Research, Grants

Kapi'olani Community College, University of Hawaii

An ecological anthropologist, Robert has published scholarly and policy research on the changing meaning of work, service, schooling, housing, and leadership for Samoans at home and abroad; health disparities confronting Samoan, Hawaiian, and Pacific Islander populations in the United States; the meaning and management of water in ancient Hawai'i; and sociocultural factors affecting fisheries in Samoa and the Northern Marianas. In 2009, he was lead editor in the publication of American Samoa's first written history.

At Kapi'olani Community College, University of Hawai'i, he serves as director of institutional effectiveness, and shapes an innovative ecology of learning. With institutional commitment and support from federal and foundation sources, the college has emerged as a leader in service-learning for improved student engagement, learning and achievement.

Nationally, he is a senior consultant and trainer for Campus Compact, and assisted in the development of the Carnegie Community Engagement Classification. He is a Faculty Leadership Fellow for NSF's Science Education for New Civic Engagements and Responsibilities initiative, and leads the Community College Affiliate Program of the National Council for Science and the Environment. He also leads the national Teagle Foundation project on stimulating civic and moral responsibility for diverse, equitable, healthy, and sustainable communities.

Ms. Courtney Freyhauf

Student

Hiram College

Courtney Freyhauf is a senior environmental studies major and sociology minor at Hiram College. She is currently employed as a near-peer mentor in The Igniting Streams of Learning in Science program, leading Pakistani and American learning communities as they develop their action research service learning projects on water. She is also involved at Hiram as a teaching assistant, writing assistant, and works at the James H. Barrow Biological Field Station. Throughout her time at Hiram College, Courtney has been interested in the integration of education and environmental issues and plans to attend graduate school in the Fall of 2015 pursuing a degree in Environmental Education.

Dr. Andrew Gelman

Professor of Statistics and Political Science, Director of the Applied Statistics Center

Columbia University

Andrew Gelman is a professor of statistics and political science and director of the Applied Statistics Center at Columbia University. He has received the Outstanding Statistical Application award from the American Statistical Association, the award for best article published in the American Political Science Review, and the Council of Presidents of Statistical Societies award for outstanding contributions by a person under the age of 40. His books include Bayesian Data Analysis (with John Carlin, Hal Stern, David Dunson, Aki Vehtari, and Don Rubin), Teaching Statistics: A Bag of Tricks (with Deb Nolan), Data Analysis Using Regression and Multilevel/Hierarchical Models (with Jennifer Hill), Red State, Blue State, Rich State, Poor State: Why Americans Vote the Way They Do (with David Park, Boris Shor, and Jeronimo Cortina), and A Quantitative Tour of the Social Sciences (co-edited with Jeronimo Cortina).

Andrew has done research on a wide range of topics, including: why it is rational to vote; why campaign polls are so variable when elections are so predictable; why redistricting is good for democracy; reversals of death sentences; police stops in New York City, the statistical challenges of estimating small effects; the probability that your vote will be decisive; seats and votes in Congress; social network structure; arsenic in Bangladesh; radon in your basement; toxicology; medical imaging; and methods in surveys, experimental design, statistical inference, computation, and graphics.

Ms. Nataliya Gorbataya

Operations Manager

National Center for Science and Civic Engagement

Nataliya earned her bachelor's degree from University of Maryland and is currently working towards her Master's degree in Nonprofit and Association Management. She has several years of experience working with nonprofit organizations and DC Public Schools as an employee and in her former capacity as a contractor for the District of Columbia Government. Nataliya assists the National Center with grant preparation/reporting, administration of grant funding, strategic planning, researching new funding opportunities, and community support activities.

Dr. Sarah Haines***Professor, Biology and Science Education******Towson University***

Sarah has been at Towson University, where she is a professor of biology and science education, for 14 years. Her work at Towson involves preparing future teachers at the elementary, middle school, and high school levels. Sarah's area of specialty is environmental education. She has been involved in several environmental education initiatives and organizations at both the state and national levels, including serving as the secretary and president of the Maryland Association for Environmental & Outdoor Education and as the Vice Chair of the Accreditation Review Panel for the North American Association for Environmental Education. While she was MAEOE president, Sarah was appointed to the Governor's Partnership for Children & Nature and served on the work group that created the Maryland Environmental Literacy Standards and that pushed for the state environmental literacy graduation requirement that became a reality a few years ago. Sarah holds a Bachelor's degree in Biology and Animal Behavior from Bucknell University, a Master's and Doctorate in Zoology from the University of Georgia, and an Master's in Education from Salisbury University. She lives in Parkton, MD with her husband, Tom, and sons Andrew (15) and Adam (10).

Dr. Fay Hansen***Associate Professor, Biological Sciences******Oakland University***

Fay Hansen is an associate professor of biological sciences at Oakland University, where mentoring undergraduates in research has been her passion. Seven years ago, after almost 20 years of research and teaching in the biomedical sciences she "re-tooled" and became trained in organic farming. She founded the Campus Student Organic Farm at OU. She developed and currently teaches classes in Organic Farming, Permaculture, Biology of Food, and she has also introduced "food" as an overarching theme in her Biology Capstone class, some of which she reports at the current meeting.

Professor Dan Kahan***Elizabeth K. Dollard Professor of Law, Professor of Psychology, Director of the Cultural Cognition Project******Yale University***

Dan Kahan is the Elizabeth K. Dollard Professor of Law and professor of psychology at Yale Law School. 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 science communication. In studies funded by the National Science Foundation, Dan and his collaborators have investigated public conflict over climate change, public reactions to emerging technologies, and public understandings of scientific consensus across disputed issues. 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.

Ms. Danielle Kraus Tarka***Deputy Executive Director******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 supervises the coordination of SENCER and the Center's national events. Danielle ensures linkages across the NCSCE's SENCER, GLISTEN, SENCER-ISE, SCEWestNet, Engaging Mathematics, and other developing 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 from the Pennsylvania State University and completed a nonprofit management executive certificate program at Georgetown University.

Dr. David McMullen

***Assistant Professor, Interdisciplinary Department of Arts and Sciences
City College of New York***

David McMullen is an assistant professor at the City College of New York, where he teaches core science courses at the Center for Worker Education. He earned a Master’s Degree and a Doctorate in Biophysics while he worked at the Medical Research Council in London as a part of Prof. Maurice Wilkins Nobel Prize-winning research team. He brings to this endeavor a lifetime of experience as an educator, an on-air TV science correspondent, and a journalist for the national press. He developed his interest in modern pedagogy while teaching teachers within the Graduate Department of The Steinhardt School of Education, at NYU. His goal is to bring the excitement of the breakthroughs in current medical science research to his students so they can apply them in their daily lives.

Dr. Cathy Middlecamp

***Professor, Nelson Institute for Environmental Studies, Howe Bascom Professor in the Integrated Liberal Studies Program, SENCER Co-PI
University of Wisconsin-Madison***

Catherine Hurt Middlecamp is a professor in the Nelson Institute for Environmental Studies and the Howe Bascom professor in the Integrated Liberal Studies Program at the University of Wisconsin-Madison. Her scholarship focuses on designing, teaching, and assessing courses that connect environmental chemistry to real-world issues. For her work, she has received teaching awards at the local, state, and national levels, including the 2011 William E. Bennett Award for Extraordinary Contributions to Citizen Science from the National Center for Science and Civic Engagement. Cathy has been with SENCER since its inception in 2000, and currently serves as a Co-Principal Investigator. With Omie Baldwin, she developed the 2004 SENCER Model course, *Chemistry and Ethnicity: Uranium and American Indians*. Cathy is the editor-in-chief for the 2014 edition of Chemistry in Context, a project of the American Chemical Society that teaches chemistry in the context of real-world issues. She has served as the lead author for the chapters on air quality, acid rain, ozone depletion, nuclear energy, polymers, food, and sustainability. She is a Fellow of the Association for Women in Science (2003), the AAAS (2004), and the American Chemical Society (2009). Cathy did her undergraduate studies at Cornell University, graduating Phi Beta Kappa. She was awarded a Danforth Fellowship for graduate study and earned her Doctorate in chemistry from the University of Wisconsin-Madison in 1976.

Dr. Mary Nucci

***Research Assistant Professor, Human Ecology
Rutgers University***

Mary Nucci is research assistant Professor in the department of human ecology at Rutgers, the State University of New Jersey where she is responsible for teaching courses in science communication. Her research is focused on evaluating public perspectives of controversial science and science in mass media and informal science (museums and science centers). Additionally she is involved in the cross-discipline focus on linking research to practice, and is working with the Giant Screen Cinema Association and the giant screen community to develop and implement research that addresses learning, affect and cognition of giant screen films. Prior to joining Rutgers University, she spent 20 years as a researcher in the biotechnology industry and at Liberty Science Center in New Jersey.

Mr. Dayson Paison

Kenan Fellow

Alamance-Burlington School System

Dayson Paison is a Kenan Fellow working with Dr. Stephanie Schuttler and Dr. Roland Kays on the eMammal Project. Using his knowledge of science pedagogy and the middle school environment, Dayson collaborated with the two researchers and two other teachers in North Carolina in order to promote and build citizen science in classrooms throughout North Carolina. The lesson Dayson is currently working on will focus on mammal activity in anthropomorphic sites. Dayson is the STEM teacher at Graham Middle School in Graham, North Carolina. He is also the science department chair and serves on several school and Alamance-Burlington School System committees. Dayson is also a Siemens STEM Institute Fellow. Dayson holds a Bachelor's degree in Biology from the University of North Carolina at Chapel Hill.

Dr. Eliza J. Reilly

Director of Programs

National Center for Science and Civic Engagement

Eliza Jane Reilly has two decades of experience in the design and implementation of programs and materials to advance curriculum, academic leadership, and faculty development. She is the director of programs for NCSCE. 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 Master's in the History of Art and a Doctorate in American History from Rutgers University. She is the general editor of the SENCER Models, the co-editor of the *Science Education and Civic Engagement: An International Journal*, and an advisory board member of SENCER-ISE.

Dr. Stephanie Schuttler

Postdoctoral Scientist in the Biodiversity Laboratory

North Carolina Museum of Natural Sciences

Dr. Stephanie Schuttler is a postdoctoral research associate at the North Carolina Museum of Natural Resources for the Students Discover project. In this role, she trains three middle school teachers in the eMammal research process and co-develops lesson plans on eMammal for middle school classrooms. With the data collected from students and other eMammal volunteers, she conducts research on the behavior and distribution of local North American mammals. Stephanie holds a PhD in Biological Sciences from the University of Missouri where she conducted research on the social structure of forest elephants.

Mr. Kyle Simmons

Faculty Development Events Coordinator

National Center for Science and Civic Engagement

Kyle Simmons is the faculty development events program coordinator for NCSCE, SENCER, and related initiatives. In this role, he plans and manages NCSCE's signature annual events, the SENCER Summer Institute and the Washington Symposium and Capitol Hill Poster Session, 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.

Ms. Robin Singleton

Student

Hiram College

Robin Singleton is a senior at Hiram College studying biology and history. This fall she is continuing her summer work as a near-peer mentor in the Igniting Stream of Learning in Science program helping to implement a tree awareness curriculum highlighting the link between forests and freshwater. In the summer of 2014 she and her fellow near-peer mentors led mixed learning communities through biomonitoring protocols assessing wetlands and streams. She is also heavily involved in academic support services and works as a Writing Assistant and a Teaching Assistant at Hiram College. She is interested in conservation biology education, the subject of one of her senior capstone projects and plans to continue her studies at a graduate level.

Dr. Dennis Taylor

Professor of Biology

Hiram College

Dennis Taylor is professor at Hiram College in the biology department, and co-director and founder of the Igniting Streams of Learning in Science (ISLS) STEM Academy Program. ISLS builds collaboration among colleges, K-12 schools, private industry and public agencies using SENCER approaches to make science relevant and meaningful. He has been an advocate of hands-on inquiry based undergraduate courses linked to investigations of local environments, and has led over 40 off campus programs including two 12 week interdisciplinary science/literature programs at 30 field sites on four continents in 9 countries looking at the impact of global warming on the Biomes of the world.

Ms. Jessica Wyndham

Associate Director, Scientific Responsibility, Human Rights and Law Program

American Association for the Advancement of Science

Jessica Wyndham is associate director of the American Association for the Advancement of Science (AAAS) Scientific Responsibility, Human Rights and Law Program, where she directs the Article 15 project, aimed at engaging the scientific community in elucidating, promoting and assisting in the realization of the human right to enjoy the benefits of scientific progress. She is also coordinator of the AAAS Science and Human Rights Coalition. Jessica has worked extensively with national human rights institutions throughout Asia, the Pacific, Africa and the Americas and served as Legal Adviser for the Brookings Institution Project on Internal Displacement and the United Nations Office of the High Commissioner for Human Rights in Ecuador. Jessica is also currently an adjunct professor at George Washington University where she teaches a graduate course on internal displacement. Jessica holds a Bachelor of arts (with Honors), a Bachelor of laws (with Honors), and a Master of laws.

Mr. Jeshua Zeglen

GLISTEN Undergraduate Stewardship Liaison

Kent State University

Jeshua M. Zeglen is an undergraduate biology student at Kent State University. Recently, he was given the opportunity to serve as an undergraduate stewardship liaison through the Great Lakes Innovative Stewardship through Education Network (GLISTEN). He holds a multitude of interests spanning a wide variety of fields. Following graduation, he intends to pursue a Master's degree in Botany or a closely related discipline.

Mr. Ryan Zittel

Student

Hiram College

Ryan Zittel is a junior undergraduate at Hiram College from Sheboygan Wisconsin where he is studying Biomedical Humanities. Along with classes, Ryan is also a member of the Men's Soccer team at Hiram. This summer he worked as a Near Peer Mentor (NPM) for the Igniting Streams of Learning in Science program, the most recent program of which was the first ever international program that ISLS has hosted and the longest ISLS summer program of three weeks in four locations. Ryan is interested in one day working for the Doctors without Borders program and hopes his experience with the students from Islamabad will help guide his future endeavors.

INVITED POSTER PRESENTATIONS

BRINGING PRIMARY SCIENTIFIC LITERATURE INTO THE CLASSROOM

The American Association for the Advancement of Science, Science Magazine

“Science in the Classroom” (<http://scienceintheclassroom.org>) is a collection of annotated research papers and accompanying teaching materials designed to help students at the advanced high school, community college, and undergraduate level understand the structure and workings of professional scientific research. Each annotated Science paper contains a “Learning Lens,” which is used to selectively highlight and explain original text of the research article. An interactive glossary is included. Additionally, an educational scaffold containing an expanded explanation of the figures, often with a close-up of the relevant section of the figure itself, has been built into each research paper. Also accompanying the papers are discussion questions, additional activities, connections to the English Language Arts Standards and the 8 Practices of the Next Generation Science Standards, and raw data provided by the authors. We will present a tutorial on how to use this resource in a classroom and would appreciate feedback from the audience on how we can continue to make an expanded “Science in the Classroom” website a valuable resource for science teachers.

Authors: Pamela J. Hines, Melissa McCartney, Marcia McNutt

THE ROLE OF NATIONAL SERVICE IN BUILDING INSTITUTIONAL CAPACITY FOR A STRONGER BACCALAUREATE AND A CIVICALLY-ENGAGED STEM WORKFORCE

California State University Chancellor's Office, and the California State Office, Corporation for National and Community Service

The California State University (CSU), as the nation’s largest four-year public university system and most ethnically diverse student body, focuses on providing an affordable, accessible and high-quality education to prepare its 450,000 students to become leaders in the changing workforce. The CSU is a vital economic engine in California, whose economy is among the largest in the world. Through a grant from the Corporation for National and Community Service, the CSU has placed 15 AmeriCorps*VISTA (Volunteers in Service to America) members in nine CSU STEM colleges, institutes and departments for the 2014-2015 inaugural CSU STEM VISTA program year. VISTA members will serve as liaisons between STEM students, faculty and staff, and community partners to develop long-term solutions for bolstering the number of underrepresented students (particularly low-income and minority students) who pursue and obtain STEM degrees.

Through community partnerships with industry leaders, nonprofits, and K-12 schools, the 15 CSU STEM VISTA members are building the capacity of the CSU STEM host sites and community partner organizations to more deeply engage students in STEM and provide more opportunities to participate in mentoring and academic support programs. These engaged learning experiences, such as service learning, internships, and undergraduate research, will not only make lasting, positive changes in local communities, but also will expand the CSU’s ability to give students the skills and knowledge needed to be successful in their majors and obtain STEM degrees and job placement, thus in turn, building the STEM workforce that our nation so desperately needs. When we recognize 39% of CSU students who have incomes

in the lowest 20% of the income stratification (income less than or equal to \$20,262), the power of the CSU STEM VISTA program to profoundly transform lives and alleviate poverty for millions is tangible.

*Authors: Kristina Barger, Judy Botelho, and Erika Randall, California State University Office of the Chancellor
Greg Ericksen, California State Office, Corporation for National and Community Service*

JUSTIFYING SERVICE LEARNING

Case Western Reserve University, Cleveland Metroparks, and GLISTEN

As an Undergraduate Stewardship Liaison through The Great Lakes Innovative Stewardship Through Education Network (GLISTEN), Ferin will work during the summer for the Cleveland metroparks while retaining her connection to Case Western Reserve University via faculty partners in the Civil Engineering and Biology departments. When the fall semester commences, she will use the experience from the summer to assist faculty partners as they utilize the metroparks in their class models. This system is designed not only to give students field experience, but to allow an opportunity for learning through service to our community partner, the Cleveland Metroparks. This unique education model, in which students provide a service while also learning, is known as service learning.

Ferin will be spending extensive time on stream surveying of the newly acquired Acacia reservation. This reservation is composed largely of an out of service golf course which is early in the restoration process. The surveying information must be collected as a part of a grant application seeking funds to do restoration on the stream. The team will be conducting both longitudinal and cross sectional data on the stream. This information will allow the team to create an elevation map of the stream and its features. The goal is for CWRU service learning students involved in the program to be able to facilitate the collection of biological data to create a more robust survey by the fall.

The aim of the project is to facilitate, identify and quantify the benefits of service learning model. As an Undergraduate Stewardship Liaison deeply involved in the GLISTEN program, Ferin advocates for service learning and believes in its benefits. However, as a program dependent on government funding, there must be proven validity in this type of education in order for it to be justified.

*Authors: Jean Burns, Ferin Neff, Case Western Reserve University
Jennifer Grieser, Cleveland Metroparks
Glenn C. Odenbrett, Case Western Reserve University*

UNDERGRADUATE STUDENT LEADERS FORGE CAMPUS-COMMUNITY CIVIC ENGAGEMENT PARTNERSHIPS: THE GLISTEN MODEL

Case Western Reserve University

This poster will provide an overview of the Undergraduate Stewardship Liaison's (USL) role in NCSCE's GLISTEN (Great Lakes Innovative Stewardship Through Education Network) project. Expanding on posters of the USLs presenting their own work at the Symposium (on display adjacent to this poster), it will focus on the unique roles that USLs have played in 10 sites across the 8 Great Lakes states. As USLs, undergraduates lead their peers in service-learning components of coursework focused on restoration and stewardship of the Great Lakes ecosystem, which contains approximately 1/5 of the world's available fresh water.

The poster will include information on the special responsibilities and skills needed by USLs, the Great Lakes-wide training program offered to help them develop these skills, and examples of how they have successfully forged civic engagement-based campus-community partnerships at the undergraduate level in disciplines such as biology, chemistry, and engineering.

USL peer leadership in addressing issues critical to Great Lakes ecosystem stewardship such as control of invasive species, wetland protection and restoration, and maintaining water quality standards will be highlighted. In particular, examples will be given of how decision-relevant data collected and analyzed during service-learning projects coordinated by the USLs have facilitated public awareness and decision-making processes in areas such as wetland management and potential environmental impacts of mining and natural gas extraction.

The presenter will engage individual attendees in dialogue focused on how the USL model could be employed on their own campuses with a variety of civic engagement opportunities in addition to the environment, such as health care. The presenter will also offer recommendations for recruitment, training, supervision, compensation, and career development of such student leaders. Specific guidance will be provided on how to seek on-going support for these leaders through the federal Work-Study program.

Author: Glenn C. Odenbrett

WATER QUALITY MONITORING ON THE UPPER MAUMEE RIVER

Defiance College and the Upper Maumee Watershed Partnership

The Maumee River, the largest tributary to the Great Lakes, is a large contributor of non-point source pollution to Lake Erie. The land use in its watershed is greater than 70% agricultural and thus nutrient runoff is a large concern and has been shown to contribute to harmful algal blooms in Lake Erie. In 2013 from spring to fall, four sites on the Upper Maumee River which stretches from Fort Wayne, IN to Defiance, OH were sampled. The sites were selected to be in a diverse range of land use areas, with one each in an urban, suburban, rural town, and agricultural area. Once a month at each site, Secchi depth, a measure of turbidity was taken, and a YSI multiprobe was used to measure temperature, dissolved oxygen, and pH. Water samples were also taken to test the concentrations of nitrate, phosphate, ammonia, chlorophyll a, and blue green algae cell count. Students have sampled the same sites in two previous years, and we are continuing to monitor this year. Should monitoring efforts continue in the future, they will provide a better understanding of the dynamics of the river and help evaluate the efficacy of current programs to reduce non-point source pollution in the watershed.

*Authors: Douglas Kane, Alison Rifenburgh, Defiance College
Stephanie Singer, Upper Maumee Watershed Partnership*

KAWKAWLIN RIVER WATERSHED ASSESSMENT

Delta College

The Kawkawlin River is an important tributary that drains a large wetland of about 225 square miles and flows directly into Saginaw Bay. Its watershed is relatively flat, and therefore the river flows very slowly giving it characteristics similar

to a pond at times. The north branch of the river contains a riparian reach that is frequently in a state of non-attainment of the Michigan standard for dissolved oxygen (5 mg/L). Analysis of this reach during the summers of 2011 and 2012 revealed chronic issues that could affect fish habitat and downstream water quality. Dissolved oxygen levels were typically below 2 mg/L, which is too low to sustain warm water fish species. Furthermore, benthic invertebrates were almost nonexistent near the anoxic areas. Severe anoxia in the riparian wetland coincided with high levels of fecal indicator bacteria (*E. coli*). Nitrogen levels (nitrate and ammonium) decreased in stream water through the riparian wetland, but phosphorus (SRP and TP) increased. The low pH and pE for the riparian wetland are consistent with conditions that can mobilize sediment bound orthophosphate, while decay of fecal contamination can be a source of total phosphorus. The Kawkawlin River exhibited phosphorus levels consistently higher than Saginaw Bay thereby implicating the river as a source of this nutrient. Continued research is needed to help determine the sources and causes of contamination, and further analysis is necessary to fully characterize the effects of prolonged anoxia on this unique river.

Authors: Michael Fisher, Kristy Miller, Danielle Tellier, Jacob VanHouten

COLLEGE ALGEBRA, OR ECONOMICS OF BEING GREEN

East Stroudsburg University of Pennsylvania

This presentation is based on experiences teaching Math 130 (*Applied Algebraic Methods*) at East Stroudsburg University of Pennsylvania. A quasi-experiment involving a section of a college algebra course taught in a “traditional” way and a section taught using the approach described here is currently in the planning stage.

The poster discusses some of the challenges faced by instructors who teach general education courses in college algebra, particularly, the challenges that stem from the fact that the students have different and uneven mathematical backgrounds, are not adequately motivated, do not see the usefulness of the course for their future careers, and, therefore, adopt questionable learning strategies. Also discussed are some of the obstacles to raising environmental awareness and to introduction of environmental-friendly solutions, particularly, the obstacles that stem from the lack of skills necessary to understand and calculate the trade-offs involved.

This poster proposes ways of addressing both types of challenges by redesigning the syllabus and the assessment structure of College Algebra courses. The focus is on the incorporation of certain types of carefully designed assignments and projects. The following are some of the key points and features of the approach:

1. Motivating the students to improve their technical skills.
2. Making an emphasis on those examples and applied problems that promote environmental awareness.
3. Assigning research projects that students can further develop in other courses or even include in their job application portfolios. Making those research projects an integral part of the course and an integral part of student learning assessment.
4. Redesigning course materials, grading schemes, and student learning assessment and incorporation of Pearson’s MyMathLab software in such a way that students of different mathematical backgrounds are better motivated to get the most out of the course.
5. Making extensive use of Pearson’s MyMathLab software in order to provide students and instructors with access to a wide variety of available literature as a source of applied problems and research projects.

Author: Yevgeniy (Eugene) Galperin

THE SERIOUSNESS OF SOCIAL JUSTICE AND THE WHIMSY OF POPULAR THEMES: HOW A MUSEUM/UNIVERSITY PARTNERSHIP FOSTERS STEM LEARNING

Hofstra University and Maritime Explorium at Port Jeff Harbor

Families design catapults to sow native plant seed balls in hard-to-reach areas. In other weeks at the Maritime Explorium, an informal STEM setting, families design traps to catch leprechauns. At STEM Studio, a formal STEM educational setting at Hofstra University, students of all ages determine the shortest route for an ambulance to bring Jose with a broken arm from the beach to the hospital, and at other times create an amusement park for birds. In both settings, participants engage in STEM learning through the power of design and the power of context.

Programs at each institution embed civic/ethics issues or whimsical/humorous prompts within STEM exhibits and curriculum. Observations and preliminary data reveal extended on-task time and more detailed creations when STEM challenges are situated in these types of contexts.

Findings suggest that STEM engagement and learning outcomes improve when settings provide participants with a real world challenge of a civic or ethical nature, or, on the other hand, with a hint of whimsicality.

*Authors: Julia C. Caliendo, and Jacqueline Grennon Brooks, Hofstra University
Lauren Hubbard, Lyndsay McCabe, Carole Van Duyn, Maritime Explorium*

STUDENT LEARNING FOR CIVIC CAPACITY: STIMULATING MORAL, ETHICAL, AND CIVIC ENGAGEMENT FOR LEARNING THAT LASTS

Kapi'olani Community College, University of Hawaii

Kapi'olani Community College (KCC) is leading the SENCER/Keck Hawaii Regional Node with the University of Hawaii Manoa (UHM), the University of Hawaii Hilo UHH), and Windward Community College (WCC). The Hawaii Team is known as Hui o Moku (group from the islands), and our central focus is on sustainability and community resilience in the context of climate change. The following courses are being SENCER-ized: *Biology and Geology* (WCC); *Civil and Mechanical Engineering, Ethnic Studies, Social Sciences* (UHM); and *Marine Science, Agriculture, Sociology* (UHH).

The New York-based Teagle Foundation has awarded \$360,000 to the Community College National Center for Community Colleges and Kapiolani Community College to lead a national project entitled, "Student Learning for Civic Capacity: Stimulating Moral, Ethical, and Civic Engagement for Learning that Lasts."

With six other community colleges, De Anza in California, Mesa in Arizona, Delgado in Louisiana, Kingsborough and Queensborough in New York, and Raritan Valley in New Jersey, the project will: (1) develop 70 courses in the Humanities, STEM, Social Science, Education, Health, and other fields that build students' current and future commitment to civic and moral responsibility; (2) develop strategies for students' continual building of this commitment across curricular and co-curricular programs to degrees and transfer; (3) develop, review, and refine a qualitative rubric-based assessment methodology for campus use and national dissemination; (4) develop, review, implement, and refine a quantitative pre- and post-test methodology for campus use and national dissemination; (5) create communities of faculty, staff, students, and administrators on each of the seven campuses to build program and institutional commitment to civic and moral responsibility; (6) engage in campus, statewide, and national dialogues on curricular and

pedagogical reform promoting civic and moral responsibility; (7) leverage additional resources from campus, state, federal, and foundation sources.

Kapi'olani will integrate the following Big Question into service-learning and sustainability designated courses: "How do we build our commitment to civic and moral responsibility for diverse, equitable, healthy, and sustainable communities?" A new Service and Sustainability Learning Reflection Journal and Service-Learning Online Research site has been developed to continuously engage students in addressing the Big Question over one and multiple semesters. The College will provide state, regional, and national leadership in preparing students to be engaged citizens and scholars building a healthier and more sustainable Hawai'i.

Author: Robert Franco

EXPLORING ENVIRONMENTAL SCIENCE WITHIN THE COMMUNITY AND ENRICHING SERVICE LEARNING AT KENT STATE UNIVERSITY

Kent State University

A dichotomy exists in modern academic practices between the presentation of a subject's theory and the practical application of said theory in the real world. Individuals working to obtain a degree, especially within the realm of the biological sciences, are often presented with an extraordinary amount of information with respect to a wide variety of concepts. Service learning works to fill that gap. A trend was noticed after investigation into previous years of service learning coursework: large quantities of student collected ecological data was present but contained in individual reports, which is not necessarily the best way to make such information accessible. Data collected in previous years were helping students, however the goal of service learning is to benefit not only students but also the community at large. Our first objective was to process this data collected in previous years and make it more usable for our community affiliate, The Portage County Park District. After speaking with a representative from our community affiliate, it was discovered that there was a definitive need for GIS data with respect to the parks. Considerable time during the summer of 2014 was spent preparing past GIS and collecting new data to be delivered to our community partner. Plans are currently being made between the community affiliate and the faculty to standardize the data collection process so that the information may be further developed by future generations of students. Alternatively, we wanted to address the ways in which data could be presented to the community for educational purposes. Students will work in the coming 2014 – 2015 academic year to create a visual presentation such as a brochure or web element that expresses interesting and useful data collected in previous years. This project is still developing.

Authors: Cassandra Clevenger, Jeshua Zeglen

INTEGRATING COURSEWORK, RESEARCH, STUDENT LEADERSHIP, SERVICE LEARNING, AND INSTITUTIONAL POLICIES TO ADDRESS STORMWATER MANAGEMENT AND LOCAL WATER QUALITY

Lourdes University

The health of freshwater systems is a key issue throughout the nation. In northwest Ohio, water quality and supply is one of seven focus areas in the current Toledo-Lucas County (TLC) Sustainability Plan. Green infrastructure (GI) is one way the TLC plan suggests to improve water quality. Stormwater runoff is a significant source of water pollution and GI projects can provide effective stormwater management and improve local water quality.

A team of students at Lourdes University, mentored by two faculty, implemented a GI project – a native plant garden – on campus to begin addressing concerns over local water quality and to contribute to TLC’s sustainability efforts. Students in ecological restoration courses used research, restoration principles and methods to design and install a native garden to collect and process stormwater from portions of two academic buildings. Plants used in this project were species native to the Oak Openings region of northwest Ohio.

This project demonstrates how students integrated classroom learning with research, leadership, service learning, grant support, and institutional and local policy. First, students incorporated classroom learning and research to design the project. Second, students demonstrated leadership by leading the design phase, by examining how campus policies could support their project, and by successfully submitting a proposal to obtain funding from the Sylvania Franciscan Village (SFV) Green Fund. Third, students learned how the project could support SFV policies and regional governmental policy (e.g., TLC Sustainability Plan) to address the community-wide issue of water quality. Fourth, students integrated service learning into their project by developing relationships with two community partners to obtain seeds of native plants and professional advice. Lastly, grant support from the U.S. EPA grant to GLISTEN and affiliated universities helped fund the service learning opportunities which students utilized to develop community partnerships for the GI project.

Authors: Cynthia Carnicom, Austin Duris, Ashley Gerkin, Jill Hojnacki, James Minesky, Robin Parker, Kelsey Schmidt

SHAPING GIRLS’ INTERESTS IN STEM AND CIVIC ENGAGEMENT

Middle Tennessee State University

Research has shown that social and environmental factors shape girls’ achievements and interests in STEM and thus contribute to the underrepresentation of women in STEM. At Middle Tennessee State University, MTSU, we recognize that there is a critical need to raise awareness and to change these social and environmental stereotypes for girls and women in Tennessee and across the South. The MTSU Women In STEM (WISTEM) Center, established in 2009, plays a strategic role in encouraging young women to explore STEM education and careers through successful K-16 programs such as the MTSU Expanding Your Horizons (EYH) Conference, GRITS (Girls Raised in Tennessee Science) Collaborative Project, and Green Girls, our newest program which centers on renewable energy and workforce development in Tennessee.

Our programs promote girls’ and women’s achievements in STEM; introduce girls to successful female role models; and help girls recognize their career-relevant skills. During an EYH conference, girls engage in hands-on STEM activities which in turn inspire them to interact with one another and the role model(s) leading the EYH workshop. The GRITS Collaborative Project leverages a state-wide network of girl-serving STEM programs and builds community. Green Girls is a collaboration between WISTEM and TN-SCORE (Tennessee EPSCoR) where girls engage in hands-on activities with a focus on sustainability. The girls propose experiments, write observations and suggest answers in scientific notebooks. We incorporate discussions about the importance of alternative energy research and ask the girls to examine solutions to today’s energy problems. We address the critical need to raise awareness and to change the stereotypes about STEM jobs for girls in Tennessee. In turn, we build STEM capacity, cultivate civic engagement and a diverse workforce in Tennessee.

Authors: Caleb Hough, Judith Iriarte-Gross, Joshua Loomis

MONMOUTH COUNTY COASTAL LAKES: ANALYSIS OF NUTRIENTS, DISSOLVED OXYGEN, AND SALINITY

Monmouth University

Due to concerns based upon 2012 studies, which found higher than minimum eutrophic level nitrate concentrations in several Monmouth County coastal lakes, monitoring of these lakes has been continued and expanded. Potential negative effects on the aquatic ecosystem include damage to fish populations and pollution of the ocean, which is in close proximity to the eastern ends of these lakes. Dissolved oxygen and total salinity analysis were incorporated in 2013; our 2014 studies added phosphate measurements. Narrow land masses separate these coastal lakes from the ocean. In October of 2012, breaches occurred in several locations due to the impact of Superstorm Sandy. This year, we returned to a few lakes not studied since the summer of 2012, to examine recovery by comparing current nutrient and pH values in these lakes with pre-storm data. Samples were collected at the eastern ends of the lakes, since the outflow will affect the ocean. Vernier sensors were used, in conjunction with a LabQuest2, to measure dissolved oxygen and temperature on-site. Vernier electrodes were used in the laboratory, with the LoggerPro computer program, to determine concentrations of nitrate and phosphate ions, pH, and salinity. Contributions to the understanding of the health of Monmouth County lakes are made via these analyses. Future studies may benefit from sample collection and data analysis throughout the year, to examine possible changes in these parameters with temperature over time. Where continued high levels of nutrients or low levels of dissolved oxygen are measured, efforts at remediation may be indicated.

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USING ABANDONED MINE DRAINAGE AS A TEACHING TOOL FOR BIOLOGY, CHEMISTRY, AND APPLICATION-BASED SERVICE

Mount Aloysius College

Within 7 miles of the campus of Mount Aloysius College in Cresson, PA, there are at least three streams severely impacted by Abandoned Mine Drainage (AMD). The acidic conditions ($\text{pH} < 3$) are toxic to macroinvertebrates, algae, and fish. Efforts have been made to utilize these sites to teach concepts in biology, chemistry, and environmental science, including sampling for water quality parameters and long-term diatom population monitoring. Students are engaged as both independent researchers and within courses in collecting and processing diatom samples, developing public service announcements, and applying course concepts to community issues. Modules have been developed to teach critical thinking when analyzing primary literature, improve student communication skills at regional society meetings through poster and oral presentations, and student-authored publishing of novel work at Microbe Library, an online digital resource. These efforts have led to collaboration with Duquesne University and 8 other regional institutions to use Application Based Service Learning as a pedagogical strategy. This includes development of a high school teacher workshop scheduled for 2015, use of diatom populations to understand biodiversity, and measurement of progress towards goals using the SALG survey. In this poster, Abandoned Mine Drainage as a teaching tool will be explored.

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Northern Virginia Community College

Through independent Faculty Learning Communities (FLCs) at Northern Virginia Community College (NVCC), we developed and piloted two intentionally cross-disciplinary courses combining science with other disciplines. ENV124 (4-credit laboratory science) employed multiple faculty from humanities and science to offer students an interdisciplinary approach to the science and civics of water. STEAM 299: *The Creative Mind: The Intersection of Art and Science* (1 credit 8-week Honors course) encouraged deep learning of Science through Art. Each student was matched with two faculty mentors -- one from science and one from an art discipline. Both of these efforts promoted student-centered learning in science and civic engagement. They also significantly improved cross-departmental faculty collaboration.

Authors: Gillian Backus, Diane Mucci, Lucinda Miller

ROLE-PLAYING AS A LEARNING STRATEGY FOR FACILITATING EFFECTIVE STEM COMMUNICATIONS TO DIVERSE AUDIENCES

Oakland University

Many individual career paths will require broader communication, critical thinking and other workplace skills than are experienced in the conventional STEM, and national STEM organizations have expressed concern for the need for effective communication of STEM fields to the public. We have addressed these issues in our SENCER-ized “food theme” capstone class. Research topics in nutrition, metabolism and agro-ecology were selected for their range of research approaches and for their societal impact. While technical reading and writing skills are emphasized in homework assignments, the primary emphasis during class is on verbal communication and listening/critiquing skills. Students work in teams throughout—representing the workplace of the future—with each team presenting 5-6 primary papers. Each presentation uses a different form of communication a scientist might be called upon to use: journal club, seminar, conference research presentation, applied research (i.e., agricultural field day/panel discussions), forum for the general public. Audience members serve as “peer reviewers,” with assigned roles ranging from grad students to grant or manuscript reviewers, regulatory agencies, industry scientists and managers, educators, medical professionals, policy makers, and lay-public. Teamwork was strongly valued as a learning strategy and as career preparation. Reflective writings and student surveys show an appreciation of the range of communication styles that occur in science, increasing comfort levels with oral presentations of scientific research and an appreciation of peer review as a learning strategy as well as a hallmark of the scientific process. Instructor perception is that as the approach evolved from simply being “assignments” to an increasing use of role-playing, students took their peer-review roles more seriously, listened critically, felt more empowered to be candid, and often worked in positive, encouraging comments where improvement was needed.

Author: Fay Hansen

Southern Connecticut State University

Students who had taken the SENCER model course *Science and the Connecticut Coast*, as well as students from similarly structured courses, are currently doing coastal environmental research that benefits community partners such as environmental regulatory agencies, the oyster industry, informal environmental education centers, and coastal town managers.

The students, who experienced civic engagement through this and related SENCER themed courses, continue to participate in local coastal research through SCSU's Werth Center for Coastal and Marine Studies. It is interesting to note that the students are often not science majors, but have developed an interest in science as a result of their experiences with these courses and with the Werth Center.

Two of the SENCER course graduates, a social work major and a business major, have been collecting data on beach erosion to assist local towns with policy decisions. Beach profile data gathered in the town of West Haven is being used to help the assistant commissioner of public works determine which beaches should receive beach nourishment and which should be surrendered to nature. One student is working on a financial analysis of the costs and benefits of a revised beach nourishment program in addition to gathering field data.

Other students, notably two Geography majors and a graduate from Biology, are working on an analysis of wave damage during Irene and Sandy. Their results are being shared with the municipal decision makers, the Army Corps of Engineers, and the Connecticut department of Energy and Environmental Protection. Early data indicates that beach width and height were primary determinants of the degree of wave damage to coastal structures. This data will be used to support a proposed change in state policy that would allow towns to reclaim beach sand eroded during storms in order to maintain the buffering capacity of local beaches in the face of large storm waves.

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TEACHING SCIENCE AND SYSTEMS THINKING THROUGH COLONY COLLAPSE DISORDER

Southern Connecticut State University

Undergraduate and graduate students at Southern Connecticut State University are engaged in learning about the factors involved in the global decline of pollinators. Although virtually all pollinators are facing significant declines in populations, the honeybee is the most common pollinator in the media and in research. We most often hear about the honeybee in the news as it has a critical role in the pollination of 3/4th of the fruits and vegetables we consume. Students at Southern Connecticut State University have an opportunity to learn about the important relationships between pollinator health and soil, water, ecosystems and economics factors. After learning the basics about honeybees and the possible factors causing Colony Collapse Disorder, students interview and/or survey beekeepers to learn what they are doing to support honeybee health and survival. Students survey Connecticut beekeepers to learn about: honeybee hive survival (overwintering), feeding strategies, as well as attitudes and practices of successful beekeepers. Students also learn about beekeeper perspectives on pesticides, GMOs, treating bees with pharmaceuticals and the future of beekeeping. The information gathered from these interviews and surveys serves as a foundation for student discussions and projects. As these interviews are saved from year to year we are hoping to identify trends in

beekeeping that may have a positive result on pollinator health and survival. Students have used what they learned to write their legislators and representatives to support a ban on pesticide use on the grounds of K-12 schools in Connecticut.

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NANODiscovery LABS AT THE UNIVERSITY OF SOUTHERN MAINE: BUILDING VERTICALLY INTEGRATED STEM LEARNING COMMUNITIES ENGAGING TRANSDISCIPLINARY CHALLENGES AT CONVERGENT STEM FRONTIERS

University of Southern Maine

Collaboration of STEM faculty and students at institutions of higher education with K-12 educators and students is critical for transformations needed across levels of STEM education. For a decade, NanoDiscovery Labs programs have integrated biosciences research and education for University of Southern Maine (USM) students while connecting to K-12 STEM education through pre-college classroom outreach and teacher professional development programs. These experiences are now being extended toward developing new course-based research experiences for vertically integrated learning communities that will include learners at all levels with particular emphasis upon developing highly capable and confident K-12 STEM teachers who can inspire and prepare students for a higher education learning environment building career development upon early and continuing research experiences, active learning, and growing self-identification as effective problem-solvers. The learning ecosystems being created will integrate science and engineering practices, crosscutting concepts, and disciplinary core ideas (the dimensions of the Next Generation Science Standards which are related to core concepts and competencies central to undergraduate student biological literacy).

STEM disciplines and programs preparing new generations of informed citizens and professionals for diverse STEM-related careers in the 21st century, are enriched and challenged by the confluence of interwoven scientific and complementary technological revolutions of the past century that prominently include the development of molecular biology, genomics, and information science which together promise to inform deeper understanding of the continuing evolutionary biology revolution that began in the 19th century. Transformational innovation arising from convergence of the physical sciences, life sciences and engineering is particularly expected at intersections of nanotechnology, biotechnology, synthetic biology, information technology, and cognitive sciences. The NanoDiscovery Labs education efforts are applying genomics and synthetic biology in projects that use evolutionarily ancient viral capsid structures as design platforms for nanobiotechnology problem-solving applied to transdisciplinary human challenges such as development and use of effective vaccines.

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THE MILWAUKEE GLISTEN CLUSTER OF THE UNIVERSITY OF WISCONSIN - MILWAUKEE

University of Wisconsin - Milwaukee GLISTEN and Alliance for the Great Lakes

GLISTEN (the Great Lakes Innovative Stewardship Through Education Network) representatives are the logistical glue between community based partners, students and faculty all with one common goal, protecting and sustaining the Great Lakes. GLISTEN student liaisons integrate discipline learning gained through the classroom coursework and partner with community-based organizations and local government agencies. The GLISTEN network involves eight close-

knit clusters located along the five Great Lakes. It spans from Northern Wisconsin near Lake Superior all the way to Buffalo NY on Lake Ontario. Clusters consist of students, faculty from 4-year and/or 2-year undergraduate institutions which have incorporated service learning into their syllabus that benefits Great Lakes. The applied service learning experience is an extension of the classroom, exposing students to everyday non profit organizations' common struggles. GLISTEN embraces education through service learning. Service learning provides students with the practical experience working on real world environmental issues. Projects vary from pulling invasive species, water quality monitoring or even organizing a beach clean up. The Milwaukee GLISTEN Cluster of UW-Milwaukee worked with a conservation course called CES 210 (*Conservation Environmental Science*). This course required students to partake in a service-learning assignment choosing from a variety local community partner. Alliance for the Great Lakes was chosen for their direct connection to the area. Alliance for the Great Lakes has an "Adopt a Beach" program involved in beach clean ups. Teams of 3-4 students are assigned a beach, given a protocol for clean up and take water samples testing for bacteria. They also tally the amount and categorize the garbage from the clean up retrieved. Last year Alliance for the Great Lakes had over 2,100 volunteers collecting over 12,000 pounds of trash. The long range goal is to partner with MATC (Milwaukee Area Technical College) having two education institutions working together to protect and sustain the Great Lakes.

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SEEKING STEM: A COLLABORATIVELY-DESIGNED DIGITAL SCAVENGER HUNT FOR MIDDLE SCHOOL STUDENTS

University of North Carolina Asheville

University of North Carolina Asheville students and faculty, in collaboration with middle school students and teachers, are building a digital scavenger hunt involving math and science content topics from the NC Standard Course of Study. The goal of the scavenger hunt is to engage 7th grade students in recognizing and finding evidence of real-world examples of the math and science content topics they are studying in class. After a piloting phase, the scavenger hunt will be rolled out to a broader audience during the NC Science Festival in April, 2015. It is our hope that this collaboration will result in an enriching science education experience for students at both levels, as both the designers (university students) and participants (middle school students) will be engaged in "seeking STEM" in the world around them.

During the fall 2014 semester, UNC Asheville students in an introductory computer science class are developing visualizations for the interactive web site, and students in an interdisciplinary service learning class are writing the scavenger hunt "challenges." Each challenge will consist of a short review module followed by instructions which guide the participant to find an example or build a model illustrating the specific concept. The middle school students will photograph each example or model and post it along with a brief explanation. Middle school teachers and curriculum specialists are involved throughout the design process to ensure that our final product is an effective, engaging and relevant learning experience. During the fall semester, the project involves active collaboration with a pilot group of middle school students, who as our end users provide feedback to our students regarding usability and content. The scavenger hunt will go live in the spring for the NC Science Festival.

Authors: Judith Beck, Susan Reiser, Cathy Whitlock

Washington College

The Chesapeake Bay's environmental restoration was first organized at the signing of the original Chesapeake Bay Agreement in 1983. Since then, four more Bay Agreements have been declared (1987, 2000, 2010, 2014). Each has sought to include more participation and a stricter set of clearer, and more timely goals for pollution reduction. Despite these plans and the independent efforts of hundreds of scholars, managers, scientists, and elected officials through the Bay's 64,000 square mile watershed, the Bay's health is not improving. In 2009, Washington College launched the Chesapeake Semester; an interdisciplinary, four-course program focused on our nation's largest estuary. Students combine classroom work with field-based, experiential learning, traveling the Chesapeake's watershed to study the history, culture, ecology, geology and the management of its resources. Students of the Chesapeake Semester focus on the interdisciplinary nature of the degradation, quickly learning that good science alone will not solve the Bay's problems; understanding the integrated cultural, economic, and political context is also critical. Through field-based experience students interact with nearly a hundred Bay involved professionals, citizens, and educators. They learn about Chesapeake cultures, identities, and values, all the while developing a holistic understanding of the centrality of the anthropomorphic causation of the accelerated environmental change. The Chesapeake Semester focuses on the cultivation of student-citizen-leaders with a curriculum that evolves from foundational disciplines to complex interdisciplinary controversies, challenging students to a commitment of involvement, skeptical interpretation, action, and progress.

Authors: Michael Hardesty, Aaron Lampman, John Seidel

GIS AT WASHINGTON COLLEGE: ISSUES-BASED, REAL WORLD EXPERIENCES IN GEOSPATIAL TECHNOLOGY

Washington College

The GIS Program at Washington College, part of the Center for Environment and Society, is exploring radical and disruptive innovations to get youth interested in and excited about geospatial technology. They have developed programs such as youth summer camps and after school programs that are combined with numerous undergraduate experiential learning opportunities. The GIS Program currently employs over 60 undergraduate interns working on a wide variety of funded geospatial technology projects. These projects include environmental analysis with 2D and 3D visualizations as well as virtual world constructions ranging from archeology sites such as Nation's first military academy, the Pluckemin Artillery Cantonment, to advanced virtual world environments for corrections facilities and for active shooter simulation training in local schools. Significant federal funding to support these programs is competitively sought from sources such as the Bureau of Justice Assistance, through the Governor's Office of Crime Control and Prevention, and the National Highway Traffic Safety Administration, through the Maryland Highway Safety Office. While the GIS program is established and operated as an entrepreneurial microenterprise, their number one mission is the experiential learning opportunities for their undergraduate students and the outreach mission they have to engage K-12 youth. And all of this has one purpose: to place these youth on clear paths to become productive members of the future geospatial technology workforce.

Authors: Stewart Bruce, John Seidel

Worcester Polytechnic Institute

This poster will highlight two project-based learning initiatives for different age groups at Worcester Polytechnic Institute (WPI) that situate STEM learning in the context of civic engagement and social needs. We will show evidence that these projects attract and retain girls and women in STEM fields.

The Interactive Qualifying Project (IQP) is a 9-credit interdisciplinary degree requirement at WPI where students address a problem at the interface of technology and society. Typically conducted in the junior year by teams of students, the majority of projects are completed off-campus: either in Worcester, at other domestic sites, or at one of many international sites. Each project is sponsored by a government or non-profit organization that presents the students with a real problem or need and suggests useful deliverables. The team takes it from there, with a faculty member serving as process coach. A recent study of the long-term effects of project-based learning on more than 2,500 WPI alumni found that women rated the impacts more positively than men in 34 of 39 areas including professional skills, world views, and personal development.

The success of the IQP directly inspired elements of Camp Reach, an informal education program for rising seventh grade girls founded in 1997 with funding from the NSF. The program begins with a two week summer residential experience and continues with ongoing mentoring, communications, and events as girls advance from seventh grade through high school. The central program feature is a service-learning design project in which teams of campers address a problem or need of a Worcester non-profit using the engineering design process. Teams are coached by middle school math and science teachers and high school women. A longitudinal study has shown that Camp Reach alumnae show more positive perceptions of engineers and greater entry into engineering majors compared with a control group. Camp Reach has been recognized with two national awards.

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