NSEC 2018
NATIONAL CONFERENCE
June 6-8, 2018 | Columbus, OH

Location: Hyatt Regency Hotel in Columbus, Ohio

Wednesday, June 6, 2018   Quick Glance Schedule

2:00 PM - 5:30 PM	Working Meeting on Communications – all registrants are invited – in Hayes.
5:30 PM - 6:00 PM	Break
6:00 PM - 7:00 PM	Reception – all registrants are invited – in Peppercorn

Thursday, June 7, 2018

7:00 AM - 8:00 AM	Breakfast in McKinley
8:30 AM - 12:00 PM	Working Meeting on Communications in Hayes
12:00 PM - 1:00 PM	Lunch in McKinley
1:00 PM - 2:00 PM	Working Meeting on Communications in Hayes
2:00 PM - 2:30 PM	Break
2:30 PM - 3:30 PM	Plenary Panel on STEM Education Centers in Hayes
3:30 PM - 4:00 PM	Roundtables I
4:00 PM - 4:30 PM	Break
4:30 PM - 5:00 PM	Roundtables II
5:00 PM - 6:30 PM	Poster + Reception

Friday, June 8, 2018

7:00 AM - 8:30 AM	Breakfast in McKinley
8:30 AM - 9:00 AM	Rapid Talks
9:00 AM - 9:30 AM	Concurrent Session I
9:30 AM - 9:40 AM	Break
9:40 AM - 10:10 AM	Concurrent Session II
10:10 AM - 10:40 AM	Break
10:40 AM - 11:10 AM	Concurrent Session III
11:10 AM - 11:30 AM	Break
11:30 AM - 12:00 PM	Roundtables III
12:00 PM - 1:30 PM	Lunch in McKinley
1:30 PM - 2:30 PM	Keynote: Deborah Loewenberg Ball, William H. Payne Collegiate Professor of education at the University of Michigan, an Arthur F. Thurnau Professor, and the director of TeachingWorks.
2:30 PM - 3:00 PM	Roundtables IV
3:00 PM - 3:20 PM	Break
3:20 PM - 4:30 PM	NSEC planning discussion. Survey of National Issues in Hayes.
4:30 PM	Adjourn

NSEC 2018 National Conference

Wednesday, June 6, 2018   Detailed Schedule

2:00 PM - 5:30 PM	**Working Meeting** on Communications in Hayes
5:30 PM - 6:00 PM	Break
6:00 PM - 7:00 PM	Reception in Peppercorn

Thursday, June 7, 2018

7:00 AM - 8:00 AM	Breakfast in McKinley
8:00 AM - 12:00 PM	**Working Meeting in Hayes**
12:00 PM - 1:00 PM	Lunch in McKinley
1:00 PM - 2:00 PM	Working Meeting Synthesis in Hayes
2:00 PM - 2:30 PM	Break
2:30 PM - 3:30 PM	Plenary in Hayes

Panel on STEM Education Centers

- Donna C. Llewellyn, Executive Director, Institute for STEM and Diversity Initiatives and Professor, College of Innovation + Design, Boise State University
- Gwen Shusterman, Professor of Chemistry; Director of STEM Education and Equity Institute, Portland State University
- Gabriela Weaver, Vice Provost for Faculty Development; Director, Institute for Teaching Excellence and Faculty Development; and Professor, Department of Chemistry, University of Massachusetts, Amherst

3:30 PM - 4:00 PM	**Roundtables I**
Round Table 1	Texas Tech University's STEM Teaching, Engagement & Pedagogy (STEP) Program: A Case Study in Implementing Multiple Strategies to Engage Faculty in STEM Reform - Ken Griffith and Suzanne Tapp, Texas Tech University
Round Table 2	Improving teaching and learning through the use of learning progressions and formative assessment strategies - Shannon Warren, Western Washington University
Round Table 3	Creating a successful faculty summer short course on STEM course design - Jennifer Weaver, Caltech
Round Table 4	Getting Faculty On Board - Mary Nelson, Jessica Rosenberg, and Julia Nord, George Mason University
Round Table 5	Impostor Syndrome among Black and Hispanic Women in STEM - Devasmita Chakraverty, Washington State University
Round Table 6	Using a Digital Learning Lab to Improve Biology Education at MIT and Online - Darcy G. Gordon, Massachusetts Institute of Technology

Round Table 7	Significant Interest Group discussion: Supporting students from 2-year schools, with a focus on undergraduate research experiences (UREs). - Laleh Cote, Lawrence Berkeley National Laboratory, UC Berkeley; Jordan Gerton, University of Utah
Round Table 8	Inaugural STEM Education Innovation and Research Institute (SEIRI) Seed Grant at IUPUI - Annwesa Dasgupta, IUPUI
Round Table 9	CUREs: An Undergraduate Research Strategy to Energize Faculty and Drive Student Success - Dabney Dixon, Georgia State University; Caroline Breitenberger, The Ohio State University

4:00 PM - 4:30 PM	Break

4:30 PM - 5:00 PM	**Roundtables II**
Round Table 1	The Ohio STEM Learning Network - Heather Sherman, Battelle Memorial Institute; Kathie Maynard, University of Cincinnati; Bob Midden, Bowling Green State University; Kate O'Hara, Cleveland State University
Round Table 2	STEM Teaching Assistants: Two Models for Supporting TAs in Learning, Valuing, and Implementing Evidence-based Instructional Practices - Judith Ridgway, The Ohio State University; Lindsay Wheeler, University of Virginia; Erica Szeyller, Jonathan Horn, and Corrie Pieterson, The Ohio State University
Round Table 3	Collaborating to Improve STEM Teacher Preparation Statewide - Edward Geary, Western Washington University; Stamatis Vokos, Cal Poly San Luis Obispo; Maile Hadley, Zeno Math
Round Table 4	A Center's Role in STEM Literacy - Steven B. Case, University of Kansas; Pradeep (Max) Dass, Northern Arizona University; Michael Odell, University of Texas at Tyler
Round Table 5	Changing the Face of Supervision - Kelli Wellborn and Christopher Stevens, University of Texas at Dallas
Round Table 6	The REFLECT Project: Spreading Evidence-Based Teaching in STEM - Stephanie Salomone, University of Portland
Round Table 7	Early College and STEM Academy: Strategies for Breaking the Generational Poverty Cycle in Rural America - Gary E. Briers, Texas A&M University
Round Table 8	Significant Interest Group discussion: Educational pathways to career pathways - John Rand, University of Hawaii
Round Table 9	Reaching Tenure-Line STEM Faculty - Gerhard G. Meisels, University of South Florida

5:00 PM - 6:30 PM	Poster + Reception
Poster 1	Active Learning in Introductory Chemistry: A Research Partnership - Kathy Asala and David Pugalee, UNC Charlotte
Poster 2	Family Learning and Outreach in Engineering and Science - Amanda M. Gunning and Meghan E. Marrero, Mercy College
Poster 3	Biology Teaching Assistant Project (BioTAP 2.0): A Network to Build a Capacity for Collaborative Research on Biology Graduate Teaching Assistant Teaching Professional Development (GTA TPD) - Gili Marbach-Ad, University of Maryland; Judy Ridgway, Ohio State University
Poster 4	A Case Study Describing the Transformation Process of Faculty Members Adopting Learner-Centered Teaching Methods - Gili Marbach-Ad, University of Maryland
Poster 5	Takeaways from the Development and Piloting of a New 12th Grade Math Course and Related Long-term Professional Development Project - Lipika Deka and Dennis Kombe, California State University, Monterey Bay
Poster 6	STEM Teacher Professional Development - Debbie Jackson and Kate O'Hara, Cleveland State University
Poster 7	Mercer University STEM/STEAM Partnerships with Stakeholders: Schools, Communities, and Industry - Zipangani Vokhiwa, Mercer University
Poster 8	Changes in Majors-Level Introductory Biology Student Content Knowledge and Motivation Associated with Participation in Peer-Led Team Learning - Sara Faust, The Ohio State University
Poster 9	Factors that Impede the Success of Centers - Christopher Andersen, Ohio University
Poster 10	National Collaborative for Research on Food, Energy, and Water Education - ; Nicole Sintov, The Ohio State University
Poster 11	Towson University Research Enhancement Program (TU-REP) - Cynthia Ghent, Towson University
Poster 12	Using a Digital Learning Lab to Improve Biology Education at MIT and Online - Darcy G. Gordon, Massachusetts Institute of Technology
Poster 13	Deliberative Democracy - Gwen Shusterman, Portland State University
Poster 14	Gateways-ND: Producing Institutional Change through STEM Faculty Engagement- Jill M. D. Motschenbacher, North Dakota State University
Poster 15	EPIC Science Education at James Madison University: Expanding Pathways, Identity and Capacity (EPIC) in Secondary Education - Kerry Cresawn, James Madison University
Poster 16	E-FT^2: Faculty Teaching Faculty about Teaching in the School of Engineering - Kumiko Haas, UCLA

Poster 17	Operation STEM - Susan D. Carver, Cleveland State University
Poster 18	The STEM Education Innovation and Research Institute (SEIRI) at IUPUI - Justin L Hess, IUPUI
Poster 19	Active Learning Initiative: Using COPUS to Study Changes in Teaching Practices Over Time - Carolyn Aslan, Cornell University
Poster 20	Making science real through community action: integration of service learning in an introductory-level course at the University of the Virgin Islands - Michele Guannel, University of the Virgin Islands, St. Thomas
Poster 21	Strategies for Building a Community of Undergraduate STEM Pre-Service Teachers - Jessica S. Krim, Southern Illinois University Edwardsville
Poster 22	Partnering K-12 Schools with Universities: Building Community through Family STEM Nights - Shande King, University of Tennessee, Knoxville
Poster 23	The STEMcoding Project: Bringing the Hour of code to the Science Classroom - Chris Orban, Ohio State University
Poster 24	The Southern California Regional Collaborative: A Partnership of 2- and 4- Year Colleges - Jess Gregg, UCLA
Poster 25	A Large-scale Study of STEM Teaching Practices in North American Universities - Paul J Wendel, Otterbein University
Poster 26	Certificates in University Teaching for Students, by Students - Jennifer E. Weaver, California Institute of Technology
Poster 27	Student Motivation and Learning in a General Education Science Course Greatly Improved by Participation in Real Science Research Addressing a Community Need - W. Robert Midden, Bowling Green State University
Poster 28	STEM Outreach - Phil Johnson, Appalachian State University
Poster 29	Cross-College Collaborations for Building STEM-Focused Networks in K-12 Education - Kathleen M. Hill, Pennsylvania State University
Poster 30	Institutional Logics and Evidence-Based Instruction in STEM Higher Education - Alejandro de la Puente, NSF
Poster 31	Infusing TA Preparatory Meetings with Pedagogy Training - Caroline Wienhold, University of Tennessee, Knoxville
Poster 32	Teamwork makes the Dream Work: Systemic Transformation of Education through Evidence-Based Reforms - Ruthmae Sears, Robert Potter, and Gerry Meisels, University of South Florida

Friday, June 8, 2018

7:00 AM - 8:30 AM   Breakfast in McKinley

8:30 AM - 9:00 AM	**Rapid Talks**
Hayes	A Spectrum of Tools to Motivate + Assess Teaching Reform - Shanna Shaked, UCLA
Hayes	Early College High School and STEM Academy: Strategies for Breaking the Generational Poverty Cycle in Rural America - Gary E. Briers, TAMU
Hayes	The Teaching Quality Framework: A scholarly approach to teaching evaluation - Jessica Keating, University of Colorado Boulder
Hayes	The STEMcoding Project: Bringing the Hour of code to the Science Classroom - Chris Orban, Ohio State University

9:00 AM - 9:30 AM	Concurrent Sessions I
Harrison	Leveraging our longitudinal data to enhance your faculty development program impact - Jennifer Frederick, Yale University
Garfield	Statewide STEM Networks: Current Status and Future Opportunities - Susan G. Magliaro, Virginia Tech; Wesley Hall, STEMx, Battelle Memorial Institute; Jennifer Zinth, Education Commission of the States
Grant	Exploring differences between STEM disciplines regarding values of skills and use of teaching practices: Quantitative and qualitative analyses of faculty and student perspectives - Gili Marbach-Ad, University of Maryland
Harding	Impacts of Service Learning on Student Engagement with Science: Examples from Introductory Courses at Three Higher Education Institutions. - Michele Guannel, University of the Virgin Islands; Amy Kulesza, The Ohio State University; W. Robert Midden, Bowling Green State University;
Hayes	**Workshop (90 minutes)** - Making the Most of Inter- and Intra-Organizational Connections: The Power of Boundary-Spanning - Lucas Hill and Julia Savoy, University of Wisconsin-Madison,

9:30 AM - 9:40 AM   Break

9:40 AM - 10:10 AM	Concurrent Sessions II
Harrison	**Panel Session (60 minutes)** - Engaging Communities for Success in STEM - Alyssa Briggs, NeoStem Ecosystem; Jan Morrison, TIES
Garfield	Who Better Than a Peer: STEM Peer Teaching as an Academic Game Changer - Susan D Carver, Cleveland State University
Grant	STEM Transfer Research Cluster (STAC) - John Rand, University of Hawaii
Harding	Striving for sustained, high-quality improvements to undergraduate STEM instruction: An emerging framework for understanding instructional development teams - Alice Olmstead and Charles Henderson, Western Michigan University

10:10 AM - 10:40 AM	Break

10:40 AM - 11:10 AM	Concurrent Sessions III
Garfield	Formal program review of STEM Centers: A director's survival guide - Sharon Locke, Southern Illinois University Edwardsville
Grant	STEM DBER Alliance - Charles Henderson, Western Michigan University
Harding	The Ohio STEM Learning Network - Heather Sherman, Battelle Memorial Institute; Kathie Maynard, University of Cincinnati; Bob Midden, Bowling Green State University; Kate O'Hara, Cleveland State University

11:10 AM - 11:30 AM	Break

11:30 AM - 12:00 PM	Roundtables III
Round Table 1	Managing Meaningful Employment of Undergraduates in STEM - Johannes Strobel, University of Missouri
Round Table 2	Reinvigorating the Leadership of a Project to Promote Use of Evidence-based Teaching Strategies: or, How to Re-Engage an Influential but Busy Team - Robert Potter, University of South Florida
Round Table 3	Developing Students' Essential Learning and Study Skills for Academic Success Within STEM Courses - Charles Roberts, Mercer University, Penfield College
Round Table 4	Alumni Perspectives: Longitudinal Impacts of the Community College Internship (CCI) at Lawrence Berkeley National Laboratory - Laleh Cote, Lawrence Berkeley National Laboratory, UC Berkeley
Round Table 5	Participatory Action Research Experiences for Undergraduates: Exploring Challenges and Opportunities of a Coordinated Approach - Laura B. Sample McMeeking, Colorado State University

Round Table 6	Learning Outcomes...Administrative Artifacts or Tools for Instructor and Student Metacognitive Practice? - David Sovic, The Ohio State University
Round Table 7	The Role of the Center in Promoting Equity and Inclusion - Donna Llewellyn, Boise State University
~~Round Table 8~~	~~Defining Transferrable STEM Skills for Mathematics and Science Classrooms - Eddie Partida, Claremont Graduate University~~
Round Table 9	The STEMcoding Project: Bringing the Hour of code to the Science Classroom - Chris Orban, Ohio State University

12:00 PM - 1:00 PM	Lunch in McKinley
1:30 PM - 2:30 PM	Keynote in Hayes **Deborah Loewenberg Ball** is the William H. Payne Collegiate Professor of education at the University of Michigan, an Arthur F. Thurnau Professor, and the director of TeachingWorks.

2:30 PM - 3:00 PM	Roundtables IV
Round Table 1	Promising Practices of STEM Resource Centers - Todd Wackerman; Sharon Locke, Southern Illinois University Edwardsville; Allison Grabert, University of Southern Indiana
Round Table 2	Fostering Grassroots Academic Reform through a Community of Practice in Equity and Privilege - Wilella Burgess, Purdue University
Round Table 3	Using Teaching Portfolios to Engage Faculty in Improving Student Learning - Jennelle Malcos and Jackie Bortiatynski, The Pennsylvania State University
Round Table 4	The Impact of Network Participation on Local STEM Reform: Lessons Learned from CIRTL - Lucas Hill, University of Wisconsin-Madison
Round Table 5	Faculty Professional Development Offered Four Ways - Judith Ridgway, Caroline Breitenberger, Amy Kulesza, and David Sovic, The Ohio State University
Round Table 6	The Care and Feeding of K-12 STEM Teachers - Jessica Dwyer, University of Utah
Round Table 7	A Spectrum of Tools to Motivate + Assess Teaching Reform - Shanna Shaked, UCLA
Round Table 8	Early College High School and STEM Academy: Strategies for Breaking the Generational Poverty Cycle in Rural America - Gary E. Briers, TAMU
Round Table 9	The Teaching Quality Framework: A scholarly approach to teaching evaluation - Jessica Keating, University of Colorado Boulder

3:00 PM - 3:20 PM	Break
3:20 PM - 4:30 PM	NSEC planning discussion. Survey of National Issues in Hayes.
4:30 PM	Adjourn

Sharing Presentations: You can post your presentations, handouts, posters here: https://goo.gl/8cBPsJ.

Are you a user of social media, tweet us #NSEC2018.

Thank You!

The NSEC 2018 National Conference could not happen without the leadership of the conference planning committee. We thank them for their invaluable help. We also thank the NSEC Steering Committee, Advisory Board, and our evaluator, Nancy Shapiro, for their guidance.

NSEC 2018 National Conference Planners
- Adrienne Bentz, Texas A&M University
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- Angie Hammons, Missouri S&T
- Theresa Hopkins, University of Tennessee
- Sheila Jones, University System of Georgia Office
- Laird Kramer, Florida International University
- Donna Llewellyn, Boise State University*
- Timothy Scott, Texas A&M University*
- Gwen Shusterman, Portland State University*

- Alice Steimle, The University of Mississippi
- Kacy Redd, Association of Public and Land-grant Universities*
- Noah Finkelstein, University of Colorado at Boulder*
- Cailin Huyck Orr, Science Education Resource Center at Carleton College*

*Also planned the working meeting sessions of the conference.

NSEC Steering Committee
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- Pratibha Varma-Nelson, Indiana University-Purdue University Indianapolis

Evaluator
Nancy Shapiro, Associate Vice-Chancellor for Academic Affairs & Special Assistant to Chancellor, University System of Maryland

NSEC Speaker Bios

Deborah Loewenberg Ball is the William H. Payne Collegiate Professor of education at the University of Michigan, an Arthur F. Thurnau Professor, and the director of TeachingWorks. She taught elementary school for more than 15 years, and continues to teach mathematics to elementary students every summer. Ball studies the practice of teaching as the active work of building relationships with children to support their learning and flourishing. She uses elementary mathematics as a critical context for investigating the challenges of helping children develop agency and understanding, and of leveraging the power of teaching to disrupt racism, marginalization, and inequity. Ball is an expert on teacher education, and her current work centers on ways to improve the quality of beginning teaching, particularly for children of color and low-income children. Ball has authored or co-authored more than 150 publications and has lectured and made numerous major presentations around the world. She has also developed distinctive collections of video records of practice that are broadly used to make practice visible and to study the work of teaching. Ball serves on the National Science Board and the Mathematical Sciences Research Institute Board of Trustees, and is the 2017–18 president of the American Educational Research Association. She has been elected to the American Academy of Arts and Sciences and the National Academy of Education, and is a fellow of the American Mathematical Society and the American Educational Research Association.

Noah Finkelstein is a Professor of Physics at the University of Colorado Boulder and conducts research in physics education, which has resulted in over 130 publications. He serves as a PI of the Physics Education Research (PER) group at Colorado and is also a co-Director of the national-scale Center for STEM Learning on campus, which has served as one of eight national demonstration sites for the Association of American Universities' (AAU) STEM Education Initiative. Finkelstein is also co-director of the Network of STEM Education Centers (NSEC), an organization of campus-based centers that serve as catalysts for educational transformation in STEM. He is increasingly involved in education policy. In 2010, he testified before the US Congress on the state of STEM education at the undergraduate and graduate levels. He currently serves as a Council member for the American Physical Society, a Trustee the Higher Learning Commission, a Technical Advisor to the AAU, member of the National Academies' RoundTable on STEM education, and collaborator with the Association of Public and Land-grant Universities' efforts in STEM education. He is a Fellow of the American Physical Society, and a Presidential Teaching Scholar and the inaugural Timmerhaus Teaching Ambassador for the University of Colorado system.

Donna Crystal Llewellyn is the founding Executive Director of the Institute for STEM and Diversity Initiatives and a Professor in the College of Innovation and Design at Boise State University. Donna spent her first career at Georgia Institute of Technology as a faculty member in the School of Industrial and Systems Engineering and then as the Director of the Center for the Enhancement of Teaching and Learning and Associate Vice Provost for Learning Excellence. While Donna's technical research interests were originally in Combinatorial Optimization, her current interests center around education issues in general, and in particular on increasing access and success of those traditionally under-represented and/or under-served in STEM higher education.
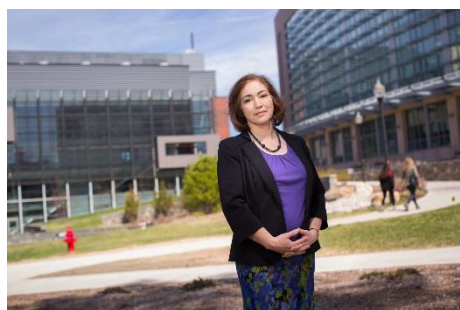
Kacy Redd is the assistant vice president of science and mathematics education policy at the Association of Public and Land-grant Universities (APLU). APLU is a higher education association in Washington, DC, with a membership of 235 public research universities in the US, Canada, and Mexico. She co-directs the Network of STEM Education Centers (NSEC), which currently links 200+ STEM Education Centers (SEC) at 163 institutions. NSEC is funded by the National Science Foundation (NSF #1524832) and has received funding from the Alfred P. Sloan Foundation. She is the Co-PI on the NSF-funded APLU INCLUDES project (#1649214) aimed at diversifying the STEM professoriate. She also serves as the staff lead for APLU's work in improving the culture of research safety at institutions and APLU's work on public access of data from federally funded research. Before joining APLU, she served as a science and technology policy fellow at the National Academy of Sciences on the Board of Higher Education and Workforce. Redd received her Ph.D. in neuroscience from Columbia University, where she was funded by a HHMI Predoctoral Fellowship, and her B.S. from the University of Southern Mississippi.
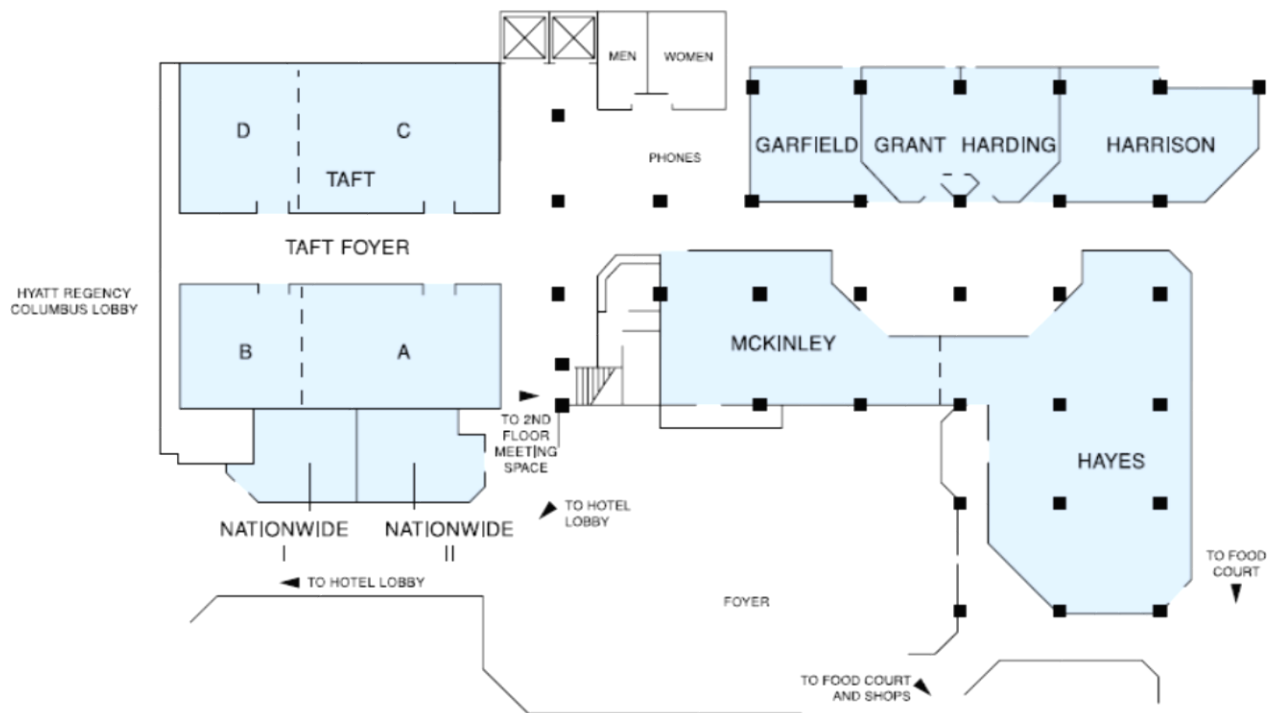
Gwen Shusterman is Director of the STEM Education and Equity Institute and Professor of Chemistry at Portland State University. Since joining the faculty at Portland State in 1989, Shusterman has focused on teaching and learning, pioneering the use of molecular graphics to teach chemical concepts and adopting innovative teaching strategies to improve student-learning outcomes. She is the recipient of the 2004 Oregon Academy of Sciences Outstanding University Educator in Mathematics and Science, and a three-time winner of the John Eliot Allen Outstanding Teacher Award. As Project Director for the PSU Howard Hughes Medical Institute Science Education Grant, *Supporting Teaching and Engaging Minds in STEM*, she is leading efforts to improve student persistence and retention in science by addressing the issues of student engagement, interpersonal relationships and

collaborations, science identity and math competency. As part of this project, teams are creating curriculum, implementing and assessing a unique pedagogical strategy utilizing deliberative democracy. Deliberative democracy engages students in the practice of discursive decision-making about real-world problems, through structured opportunities for students to critically examine, reflect upon, and engage in collaborative discursive activities on an issue with the intentional purpose to develop consensual decisions based on scientific information and reasoning. Shusterman received her B.S. in Chemistry from the University of California, Irvine and her Ph.D. in Physical Chemistry from the University of California, Berkeley.

Gabriela Weaver serves as vice provost for Faculty Development, and director of the Institute for Teaching Excellence and Faculty Development (TEFD) at the University of Massachusetts, Amherst. In her early career as an assistant professor in the Department of Chemistry at the University of Colorado at Denver she shifted the focus of her research work from physical chemistry to STEM education. From 2001 to 2014 she served on the faculty at Purdue University as associate professor and professor of chemistry and science education and later as the Jerry and Rosie Semler Director of the Discovery Learning Research Center. In 2012, she was elected as a fellow of the American Association for the Advancement of Science for distinguished contributions to transforming science education at the undergraduate and pre-college levels through the use of inquiry-based pedagogies and innovative technologies. She has been a co-author on two different first-year chemistry textbooks, and the 2015 book *Transforming Institutions: Undergraduate STEM Education for the 21st Century,* as well as author of numerous scholarly articles and book chapters on topics in science education. From 2004-2012, she served as director of the NSF-funded multi-institutional CASPiE project (Center for Authentic Science Practice in Education) dedicated to involving first- and second-year undergraduate students in real research experiences as part of their regular laboratory course curricula. Her research interests include the development, implementation and evaluation of instructional practices that engage students and improve their understanding of science, and the institutionalization of such practices through the transformation of cultures and processes in higher education. She earned a B.S. degree in chemistry from the California Institute of Technology and a Ph.D. in chemical physics from the University of Colorado at Boulder.

MEETING ROOMS
FIRST FLOOR

A Spectrum of Tools to Motivate + Assess Teaching Reform

Time: 8:30 AM on Friday, June 8, 2018   **Location:** Hayes

Speakers: Shanna Shaked, Center for Education, Innovation and Learning in the Sciences, UCLA

Additional Authors: Suchi Amin, Brit Toven-Lindsey, Casey Shapiro, Hannah Whang, Marc Levis-Fitzgerald, Erin Sanders, Kelly Wahl; all at UCLA

Strands: Improving the Quality of Education, Assessment, Research

Abstract: One of our institutional tools in working toward increased persistence and decreased achievement gaps is the building and refinement of an "institutional dashboard" system for faculty and administrators to easily explore and identify courses with high potential for improvement. Dashboard data from nearly 8,000 students who have taken an introductory physics for life science course indicate that URM students are almost three times as likely to fail as non-URMs. Using concept inventory learning gains to assess interventions in this introductory physics course, we found increased conceptual learning in sections using active learning. Digging deeper, we analyzed the effects of using LAs in this physics course, implementing LAs in only some of the sections, so that the instructor and materials were held constant. We used a multi-regression model to find LAs associated with significant improvement in conceptual normalized learning gains. Although we identify decreased failure and increased conceptual learning, our analyses did not reveal decreased achievement gaps or increased success in future courses, for either active or LA-supported courses. Read more here:
https://serc.carleton.edu/StemEdCenters/prog_descriptions/204384.html

Early College High School and STEM Academy: Strategies for Breaking the Generational Poverty Cycle in Rural America

Time: 8:30 AM on Friday, June 8, 2018   **Location:** Hayes

Speakers: Gary E. Briers, Agricultural Leadership, Education, and Communications, TAMU

Strands: Retention and Success, Improving the Quality of Education, Broadening participation, Partnerships Beyond the University

Abstract: School-wide Early College--for ALL high school students at Roscoe Collegiate ISD (RCISD)--and STEM Academy designation have led to four private-public partnerships in STEM-related enterprises. More than 90% of RCISD's seniors complete an associate of science degree at high school graduation. Simultaneously, students earn industry-recognized certification in STEM fields as FAA-licensed UAV pilots, veterinary assistants, health care workers, welders, and/or computer technicians/network administrators. Because students earn a college parallel associate degree (versus an associate of applied science"often considered a "terminal degree"), graduates can and do continue to matriculate into STEM majors for baccalaureate degrees. These results are in a public school district with fewer than 30 graduates annually in a rural community of fewer than 2,000 residents. Two additional goals remain to be achieved: 90% of those associate degree/high school diploma recipients will earn baccalaureate degrees and 90% of those will earn a graduate or professional degree. Read more here:
https://serc.carleton.edu/StemEdCenters/prog_descriptions/204249.html

The Teaching Quality Framework: A scholarly approach to teaching evaluation

Time: 8:30 AM on Friday, June 8, 2018   **Location:** Hayes

Speakers: Jessica Keating, Center for STEM Learning, University of Colorado Boulder

Additional Authors: Jessica Keating, Joel Corbo, Mark Gammon, Daniel Reinholz*, Noah Finkelstein -- CU Boulder and *San Diego State University

Strands: Improving the Quality of Education, AssessmentInstitutional change

Abstract: We introduce a framework for supporting and assessing teaching quality across all departments on a campus (i.e. a Teaching Quality Framework, or TQF). The TQF has two essential elements: (1) categories that define teaching as a scholarly activity, and (2) a change process for implementation. To assess teaching quality, we draw on three perspectives--faculty members, their students, and their peers--as sources of data. The TQF scholarly categories are held constant across departments, but each department contextualizes them according to the specifics of their discipline. The implementation strategy is grounded in theories of organizational change and is designed to lead to campus-wide adoption. This strategy is not a top-down mandate; it focuses on bringing together key faculty leaders and departments and providing them with a structure to co-create, test, and evaluate an assessment system in the context that makes the most sense to them. This approach to improving teaching quality is one of many supported by the AAU and the Bay View Alliance. (In particular with the support of NSF, we draw from similar approaches at U Kansas, U Massachusetts Amherst, and Michigan State University.) Read more here:
https://serc.carleton.edu/StemEdCenters/prog_descriptions/200613.html

The STEMcoding Project: Bringing the Hour of code to the Science Classroom

Time: 8:30 AM on Friday, June 8, 2018   **Location:** Hayes

Speakers: Chris Orban, Ohio State University

Additional Authors: Richelle Teeling-Smith, Professor, University of Mt. Union

Strands: Improving the Quality of Education, Broadening participation, Research

Abstract: Despite the success of code.org and the hour of code(TM), very little content currently exists to integrate coding into introductory STEM courses even though computer science is now designated as a "core subject". In fall 2017, the STEMcoding project released an hour of code activity (go.osu.edu/hourofcode) on the physics of video games and started a youtube channel (go.osu.edu/STEMtube). Importantly, a high percentage of the people featured in the videos come from underrepresented groups in STEM, and we try to ensure that it is mostly undergrads on screen, rather than professors or post-docs. This poster provides an overview of the coding resources that are freely available, summer training opportunities for teachers and future plans. Read more here:
https://serc.carleton.edu/StemEdCenters/prog_descriptions/206289.html

Leveraging our longitudinal data to enhance your faculty development program impact

Time: 9:00 AM on Friday, June 8, 2018   **Location:** Harrison

Speakers: Jennifer Frederick, Center for Teaching and Learning, Yale University

Additional Authors: Meghan Bathgate, HHMI Postdoctoral Fellow, Center for Teaching and Learning, Yale University; Elizabeth Luoma, STEM Education Program Director, Center for Teaching and Learning, Yale University

Strands: Improving the Quality of Education, Assessment, Engaging Faculty

Abstract: STEM faculty participants in teaching development programs may be satisfied and even report short-term gains in skills and knowledge, but how do program leaders demonstrate longer-term outcomes that represent the true goals of the training? Measuring long-term impact of training programs poses common limitations such as funding timelines and access to robust data infrastructure. Participants in this interactive workshop will learn about longitudinal findings from a national STEM faculty development program, the Summer Institutes on Scientific Teaching, and apply these results to their own initiatives. We will work collaboratively to translate relevant findings into specific strategies for curricular and program development. These efforts will be synthesized by brainstorming additional questions that will inform our collective effort and future evaluation emphasis.

Statewide STEM Networks: Current Status and Future Opportunities

Time: 9:00 AM on Friday, June 8, 2018   **Location:** Garfield

Speakers: Susan G. Magliaro, Virginia Tech; Wesley Hall, STEMx, Battelle Memorial Institute; Jennifer Zinth, HIgh School and STEM, Education Commission of the States;

Additional Authors:

Strands: Partnerships Beyond the University

Abstract: Statewide STEM networks have advanced the quality of and access to educational opportunities in science, technology, engineering, and mathematics programming for over 30 years. The purpose of this panel discussion is to share the current status of statewide STEM networks and plans and possibilities for the future of networks from three distinct perspectives. First, an update of the NSEC-sponsored Statewide STEM Networks Inventory Project will be presented. Second, to elaborate the profiles of these networks, an analysis by the Education Commission of the States will be presented. Finally, the future of these networks and final summary will be shared by the leadership of STEMx, the multi-state STEM network that is supporting educational opportunities in 21 states. An interactive conversation inviting questions and feedback will conclude the panel discussion.

Exploring differences between STEM disciplines regarding values of skills and use of teaching practices: Quantitative and qualitative analyses of faculty and student perspectives

Time: 9:00 AM on Friday, June 8, 2018   **Location:** Grant

Speakers: Gili Marbach-Ad, CMNS Teaching and Learning, University of Maryland

Additional Authors: Carly Hunt and Kaci Thompson, University of Maryland

Strands: Retention and Success, Research, Engaging Faculty

Abstract: Employers of undergraduates from Science, Technology, Engineering, and Mathematics (STEM) programs report that students frequently lack important workplace skills (e.g., collaboration and writing skills). Our Survey of Teaching Beliefs and Practices for Undergraduates (STEP-U) assesses how much students value skills needed for the workplace (e.g., ability to work in groups), and student experiences with teaching practices thought to reinforce such skills (e.g., groupwork). In the present study, we compare findings from STEP-U responses from students belonging to five STEM disciplines (N=2405): Biology, Chemistry, Physics, Mathematics and Computer Science. We also present quantitative data from faculty members about the values they attribute to skills included on the STEP-U. To shed light on quantitative results, we interviewed 5 students from each discipline, and conducted focus groups in faculty meetings where we shared the data obtained from students, and asked faculty members to generate explanations for results and provide feedback about the survey. These meetings were very positively received and have catalyzed several collaborations between faculty members and the Teaching and Learning Center.

Impacts of Service Learning on Student Engagement with Science: Examples from Introductory Courses at Three Higher Education Institutions.

Time: 9:00 AM on Friday, June 8, 2018   **Location:** Harding

Speakers: Michele Guannel, Virgin Islands Institute for STEM Education Research and Practice, University of the Virgin Islands; Amy Kulesza, Center for Life Sciences Education, The Ohio State University; W. Robert Midden, Northwest Ohio Center for Excellence in STEM Education, Bowling Green State University;

Additional Authors: Michelle Peterson, University of the Virgin Islands, St. Croix; Joan Ledbetter, University of the Virgin Islands, St. Croix

Strands: Retention and Success, Improving the Quality of Education, Broadening participation, Partnerships Beyond the University

Abstract: Service learning can be effective for increasing student interest in science, motivation to learn, and depth of learning in introductory science courses. Three higher education institutions, 1) the University of the Virgin Islands (UVI), an HBCU serving the U.S. Virgin Islands, 2) The Ohio State University (OSU), a Big Ten research university in Columbus, and 3) Bowling Green State University (BGSU) in northwest Ohio, a regional public research university, introduced service learning in their science courses. In Science 100, a course on natural disasters in the Caribbean, UVI offers students the

option of conducting a service learning project that addresses the two devastating Category 5 hurricanes, Irma and Maria that struck the Islands in 2017. At OSU, service learning was introduced to help students make connections between course content and the real world and empower students to solve community problems in the honors introductory biology course. BGSU developed a general education science course for non-science majors that was entirely focused on students learning science by conducting an investigation of the contamination of household water wells by crude oil from abandoned oil wells, a unique problem in that area. The key strategies, practices, and outcomes of these three courses will be compared and contrasted.

Workshop: Making the Most of Inter- and Intra-Organizational Connections: The Power of Boundary-Spanning

Time: 9:00 AM on Friday, June 8, 2018   90-minute session   **Location:** Hayes

Speakers: Lucas Hill and Julia Savoy, University of Wisconsin-Madison

Additional Authors: Jessica Schein, Michigan State University

Strands: Partnerships Beyond the University, Institutional change, Managing a Center

Abstract: Multi-institutional networks in higher education (like NSEC) have become common in STEM education reform. Typically, a small number of institutional representatives perform an important boundary-spanning function by being the primary connection between their institution and the Network. These representatives engage in multiple inter- and intra-organizational boundary-spanning behaviors in service to their local reform activities, thus, mediating the impact of network participation. Based upon research on the Center for the Integration of Research, Teaching, and Learning (CIRTL), the purpose of this workshop is to have participants map and thinking deeply about their current and aspirational inter and intra-organizational connections and boundary spanning behaviors related to their STEM education centers. Upon completion of the workshop, participants will be better able to "see" the implications of network participation, identify areas where they may strengthen connections or boundary-spanning activities, and develop an action plan to further advance the missions of their STEM education centers.

Panel Session: Engaging Communities for Success in STEM

Time: 9:40 AM on Friday, June 8, 2018   60-minute session   **Location:** Harrison

Speakers: Alyssa Briggs, NeoStem Ecosystem; Jan Morrison, TIES;

Additional Authors:

Strands: Retention and Success, Improving the Quality of Education, Broadening participation, Assessment, Research, Partnerships Beyond the University, Engaging Faculty, Institutional change

Abstract: Learn best practices for building strong learning ecosystems featuring dynamic collaborations among schools, out-of-school time programs, STEM-expert institutions, the private sector, community-based organizations, youth and families. The STEM Learning Ecosystem, a national initiative of 54 communities across the country, has been pioneering best practices in STEM education. The core of the STEM Learning Ecosystem model is dynamic collaborations across the community. From art museums to science centers, from business to neighborhood centers, from higher education to cultural institutions, people are working together to provide meaningful and immersive STEM experiences for youth, especially those in underserved communities. The ecosystems that are a part of the STEM Learning Ecosystem movement approach their work differently. Some see themselves as an incubator of projects; others view their role as conveners and coordinators. All, however, view their missions nearly identically: To provide the architecture for cross-sector learning, offering all young people access to STEM-rich learning environments so that they can develop important skills and engagement in STEM. In this workshop, leaders of the national STEM Learning Ecosystem initiative as well as an Ohio-based ecosystem will join together to explain how the work is being done, how it can be replicated, why it is important and evidence that it is working.

Who Better Than a Peer: STEM Peer Teaching as an Academic Game Changer

Time: 9:40 AM on Friday, June 8, 2018   **Location:** Garfield

Speakers: Susan D Carver, STEMM Education Center, Cleveland State University

Additional Authors: John P. Holcomb, Debbie Jackson, Andrew Resnick, and Elaine L. Barnes, Cleveland State University;Candice M. Quinn, Middle Tennessee State University

Strands: Retention and Success, Improving the Quality of Education, Broadening participation

Abstract: Peer teaching models improve grades, reduce withdrawal rates and increase graduation rates in historically difficult courses (Burmeister, et al., 1996) that serve as barriers to STEM degrees. Operation STEM (OpSTEM) helps improve performance in chokepoint math courses at Cleveland State University (CSU). Precalculus and Calculus pass rates have significantly increased from a pre-OpSTEM 55-60% pass rate to 72-80%. Student STEM Peer Teachers (SPTs) prepare and implement engaging, hands-on lessons to cement math concepts. Workshop participants will learn about the model and identify components for implementation. Participants will explore the feasibility of implementing mandatory STEM Peer Teacher sessions by identifying availability of: funding sources; online scheduling and

classroom space for the SPT Sessions; meeting, planning and tutoring space; recruitment of peer teachers; and identifying a dedicated leader. SPT employee manuals, job descriptions, training agendas, sample session schedules, lesson plans, engaged learning activities, formative assessments, and program evaluation surveys will be available online

STEM Transfer Research Cluster (STAC)

Time: 9:40 AM on Friday, June 8, 2018   **Location:** Grant

Speakers: John Rand, STEM Education, University of Hawaii

Strands: Partnerships Beyond the University

Abstract: The pathway for STEM transfer student can be arduous at times and there are many challenges for institutions committed to supporting these students. In this session, we will discuss the progress made at the University of Hawaii in strengthening the transfer process. We will identify and share high impact practices, and introduce efforts to develop a STAC network of U.S. STEM Education Centers to establish a "STEM transfer toolkit" that can potentially transform how undergraduates are supported and retained.

Striving for sustained, high-quality improvements to undergraduate STEM instruction: An emerging framework for understanding instructional development teams

Time: 9:40 AM on Friday, June 8, 2018   **Location:** Harding

Speakers: Alice Olmstead, Center for Research on Instructional Change in Postsecondary Education, Western Michigan University; Charles Henderson, Mallinson Institute for Science Education and Center for Research on Instructional Change in Postsecondary Education, Western Michigan University;

Additional Authors: Andrea Beach and Diana Sachmpazidi, Western Michigan University

Strands: Research, Engaging Faculty, Institutional change

Abstract: Change efforts involving teams of instructors are thought to create higher quality outcomes and more sustained improvements than instructors working alone. But not all team-based efforts are successful, and research in this area is quite limited. We are addressing this limitation by interviewing project leaders and team members who are currently engaged in such work at institutions across the U.S. In this session, we will describe our initial framework that categorizes structural and contextual factors likely to influence team processes, which are tied to team success. Participants will be asked to discuss how the setup of three typical teams in our dataset might be consequential for their success. Afterwards, participants should be better able to: (1) list critical categories to consider when initiating or supporting instructional development teams; (2) reason about how particular structural and contextual factors might influence teamwork processes; (3) apply our framework to their own work.

Formal program review of STEM Centers: A director's survival guide

Time: 10:40 AM on Friday, June 8, 2018   **Location:** Garfield

Speakers: Sharon Locke, Center for STEM Research, Education, and Outreach, Southern Illinois University Edwardsville

Strands: Managing a Center

Abstract: Periodic formal program review of a STEM Center is a means of assessing center effectiveness and providing formative feedback to help shape future directions. In 2017-2018 the STEM Center at Southern Illinois University Edwardsville underwent its first formal program review, producing a self-study report incorporating stakeholder surveys and an analysis of strengths, areas for improvement, and plans and strategies for the future. The diverse data types collected during the five years prior to the review were critical to the positive outcome of the review, including faculty and student impact numbers, proposal and publications metrics, networks, and media presence. This presentation will share the details of the full review process, key features of the self-study report, and the director's perspective on the data and strategic moves that were most important to achieving a high rating.

STEM DBER Alliance

Time: 10:40 AM on Friday, June 8, 2018   **Location:** Grant

Speakers: Charles Henderson, Mallinson Institute for Science Education, Western Michigan University

Additional Authors: Noah Finkelstein, University of Colorado Boulder, Boulder; Scott Franklin, Rochester Institute of Technology; Shirley Malcom, American, Association for the Advancement of Science; Chris Rasmussen, San Diego State University; Kacy Redd, Association of Public and Land-grant Universities; Beth Ruedi, American Association for the Advancement of Science; Kristen St. John, James Madison University; Gabriela Weaver, University of Massachusetts Amherst

Strands: Improving the Quality of Education, Broadening participation, Research

Abstract: Discipline-based Education Research (DBER) is now embedded in most STEM disciplines. Situating within a discipline brings a number of important affordances to individual researchers, including access to professional member societies and integration into departments. While productive for some research questions, this approach has prevented progress on larger cross-cutting research topics that intrinsically span multiple disciplines, and prevented the formation of a broad community to establish norms and standards. The STEM DBER Alliance (DBER-A) was recently initiated with seed funding from NSEC to help address this need. In its starting phase DBER-A convened two workshops that brought representatives of the STEM DBER communities together to identify common needs and cross-disciplinary research priorities. In this presentation we will discuss the need for DBER-A, outcomes of the workshops and other current activities, as well as our vision for the future. We will invite participants to provide feedback on the future plans for DBER-A.

The Ohio STEM Learning Network

Time: 10:40 AM on Friday, June 8, 2018   **Location:** Harding

Speakers: Heather Sherman, Education and Philanthropy, Battelle Memorial Institute; Kathie Maynard, College of Criminal Justice, Education, and Human Services, University of Cincinnati; Bob Midden, Northwest Ohio Center for Excellence in STEM Education, Bowling Green State University; Kate O'Hara, Teacher Education, Cleveland State University

Strands: Broadening participation, Partnerships Beyond the University

Abstract: The Ohio STEM Learning Network (OSLN) is a network of 44 state-designated STEM schools (K - 12) managed by Battelle Education - the philanthropic arm of the world's largest nonprofit research center, Battelle Memorial Institute. To receive STEM designation, schools are required to create meaningful partnerships with business, Industry, and university partners in their local communities. OSLN is divided into 7 regional hubs, with Battelle funded hub-director positions in each region. Hub directors connect STEM schools with industry, community, and higher education partners within each region, to ensure students have access to relevant, hands-on learning experiences. Several OSLN hub directors are co-located at higher education institutions. This panel discussion features hub directors from the University of Cincinnati, Cleveland State University and Bowling Green State University who will share examples of how they create and develop partnerships that benefit students in their communities from PK - 20.

Texas Tech University's STEM Teaching, Engagement & Pedagogy (STEP) Program: A Case Study in Implementing Multiple Strategies to Engage Faculty in STEM Reform

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 1

Speakers: Ken Griffith, Teaching, Learning & Professional Development Center, Texas Tech Univiversity; Suzanne Tapp, Teaching, Learning & Professional Development Center, Texas Tech University;

Strands: Assessment, Engaging Faculty

Abstract: The Teaching, Learning & Professional Development Center (TLPDC) at Texas Tech University (TTU) created the STEM Teaching, Engagement & Pedagogy (STEP) Program in Fall 2016 in response to the well-known 2012 PCAST recommendation to improve STEM instruction by leveraging a STEM-specific faculty development program housed within a nationally recognized Center for Teaching and Learning (CTL). The STEP Program implements a comprehensive approach utilizing observational, qualitative and quantitative data to support the adoption and implementation of Evidence-Based Instructional Practices (EBIPs) for our research-focused STEM faculty. This session will describe the tools we use, such as faculty-led workshops, videotaped observations, qualitative observational feedback, quantitative observational feedback, such as COPUS, student feedback through an Instructional Diagnosis (ID) and peer mentoring. This session will guide participants through the various program components of the STEP Program and answer questions about how these components may be adapted to fit a number of STEM Center models.

Improving teaching and learning through the use of learning progressions and formative assessment strategies

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 2

Speakers: Shannon Warren, Science Mathematics and Technology Education (SMATE), Western Washington University

Additional Authors: Edward Geary, Western Washington University

Strands: Improving the Quality of Education, Engaging Faculty

Abstract: "Change at the Core" (C-Core) is a multi-disciplinary project working to transform undergraduate STEM education at one university and two 2-year colleges. C-Core's primary goal is to improve all students' engagement, learning, and success in STEM by creating a critical mass of STEM faculty who regularly use a student-centered approach to teaching. Approximately 100 STEM faculty members are collaborating to improve STEM teaching and learning in their courses. Instead of focusing on reform of entire courses/course sequences, the emphasis is on reforming units of instruction. Faculty are creating unit learning progressions to identify big ideas, designing learning targets and success criteria, and developing formative assessment tasks aligned with the learning target to collect and share evidence of student understanding. Our workshop will show participants how to use learning progressions and formative assessment tasks with faculty and consider how these tools can guide education reform efforts in participants' own contexts.

Creating a successful faculty summer short course on STEM course design

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 3

Speakers: Jennifer Weaver, Center for Teaching, Learning, & Outreach, Caltech

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: How do we best engage faculty in course design as they prepare for the next academic year? At Caltech's Center for Teaching, Learning, & Outreach, we offer a four session short course where faculty learn about the process of backwards design, developing learning outcomes and activities, designing assessments, and fostering an inclusive classroom. By the end of the course, faculty are able to identify active learning approaches, critically evaluate current assessment strategies to determine whether they meet learning outcomes and (re)devise a course syllabus. While difficult to measure, we believe that this program is successful based on the number of times faculty have revisited our center asking for consultations, observations and mid-quarter feedback surveys. We would like to share our program from Caltech and facilitate a discussion about what other models exist at other institutions and the successes, challenges and tradeoffs of implementing these different models.

Getting Faculty On Board

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 4

Speakers: Mary Nelson, Mathematics Department/STEM Accelerator, George Mason University; Jessica Rosenberg, Astronomy/STEM Accelerator, George Mason University; Julia Nord, Geology/STEM Accelerator, George Mason University;

Strands: Retention and Success, Institutional change, Managing a Center

Abstract: Institutional change is always challenging, but the STEM Accelerator at George Mason University has made significant in-roads through their Learning Assistant (LA) program, summer camps, and STEM retention successes. This unique Center brings together 7 faculty members from 6 STEM departments who teach half time in their disciplines during the academic year, thus maintaining contact with subject-area colleagues. They work half-time during the academic year, and full time in the summer on programs aimed at recruiting and retaining STEM students. Panelists will discuss the LA program, which has expanded from 2 to 92 LAs in six years enabling faculty to enhance their teaching with active learning; the summer Math Readiness and STEM Boot camps for in-coming freshmen that target retention of rural and first generation college students; the new two-semester Calculus I course which takes students from 15% to 85% pass rates; and the administrative structure of this Center.

Impostor Syndrome AM ong Black and Hispanic Women in STEM

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 5

Speakers: Devasmita Chakraverty, Health Science STEM Education Research Center, Washington State University

Strands: Broadening participation

Abstract: Promising models of STEM undergraduate education improvement should be inclusive of the underrepresented minority groups. Blacks and Hispanics are disproportionately underrepresented in many STEM fields. In an ongoing study, we interviewed six Black and eight Hispanic women, asking open-ended questions about their experiences on impostorism, including probes that encouraged them to focus on their racial/ethnic identity. Black women shared several examples of racism, stereotyping, bias, and sexual harassment that often made them feel invisible. Hispanic women also reflected on reasons why they felt like impostors due to their Hispanic identity, such as isolation due to not having other Hispanic students in the department, their first-generation college student status, and language barriers for non-native English speakers impeding their facilty with professional networking and socializing. Findings provide insight into the experiences of impostorism attributed to Black and Hispanic identity, nudging us to rethink undergraduate STEM education that is inclusive of the underrepresented minorities as they prepare for a STEM career.

Using a Digital Learning Lab to Improve Biology Education at MIT and Online

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 6

Speakers: Darcy G. Gordon, Biology, Massachusetts Institute of Technology

Additional Authors: Swati B. Carr, Massachusetts Institute of Technology; Mary Ellen Wiltrout, Massachusetts Institute of Technology

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: The advent of Massive Open Online Courses (MOOCs) catalyzed an increased application of the learning sciences and digital technology to improve MIT student experiences and instructional effectiveness. The Digital Learning Lab (DLL) members (DLL Scientist and Fellows) in Biology apply their biology PhDs and experience in the learning sciences, technology, and project management to collaborate with faculty to enhance learning in on-campus courses, and develop online activities and MOOCs. Their deliberate curriculum design that aligns course elements and promotes core scientific competencies through active learning is ultimately facilitated through the use of digital technology. Through the resulting feedback loop, on-campus and MOOC experiences inform best practices for digital and hybrid learning, and further discipline-based educational research. A Biology DLL Fellow will discuss lessons learned from the DLL model as an innovative improvement of biology instruction in higher education and their applicability to STEM education centers with different needs.

Significant Interest Group discussion: Supporting students from 2-year schools, with a focus on undergraduate research experiences (UREs).

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 7

Speakers: Laleh Cote, Workforce Development & Education (at LBNL), Graduate Group in Science & Mathematics Education (at UC Berkeley), Lawrence Berkeley National Laboratory, UC Berkeley; Jordan Gerton, Center for Science and Mathematics Education/Physics & Astronomy, University of Utah;

Additional Authors: Colette Flood, Lawrence Berkeley National Laboratory; Anne Baranger, UC Berkeley; Elisa Stone, UC Berkeley; Max Helix, UC Berkeley; Astrid Zamora, UC Berkeley

Strands: Retention and Success, Broadening participation, Assessment, Partnerships Beyond the University, Institutional change

Abstract: This roundtable is an opportunity for the community to share how they are supporting students from 2-year schools. We are interested in discussing models of program articulation, data sharing, mechanisms that promote inclusion of transfer students, and undergraduate research experiences.

Inaugural STEM Education Innovation and Research Institute (SEIRI) Seed Grant at IUPUI

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 8

Speakers: Annwesa Dasgupta, Office of Vice Chancellor for Research, IUPUI

Additional Authors: Justin Hess, IUPUI; Pratibha Varma-Nelson, IUPUI

Strands: Improving the Quality of Education, Assessment, Engaging Faculty

Abstract: This poster presentation will feature Dr. Varma Nelson (Founding Executive Director) and Dr. Hess (Assistant Director) of the STEM Education Innovation and Research Institute (SEIRI) at IUPUI. SEIRI's mission is to advance the state of the art of STEM education research and innovation across IUPUI's campus and beyond. This poster will present various projects and initiatives that SEIRI has begun implementing to promote excellence in STEM education research and practice. We hope to gather feedback from the community on these efforts. The primary topic of interest will be managing an institute, such as SEIRI, that seeks to realize these aims through multiple objectives. Discussion topics include: (1) Establishing faculty partnerships and collaboration in institute objectives; (2) Implementing change efforts that involve the distribution of awards or small grants; (3) Promoting an institutional culture that values Discipline-Based Education Research; and (4) Establishing the reputation of an institute through marketing, communication, and branding.

CUREs: An Undergraduate Research Strategy to Energize Faculty and Drive Student Success

Time: 3:30 PM on Thursday, June 7, 2018   **Location:** Round Table 9

Speakers: Dabney Dixon, Office of STEM Education Initiatives, Georgia State University; Caroline Breitenberger, Center for Life Sciences Education, The Ohio State University

Additional Authors: Paul Ulrich, Office of STEM Education Initiatives, Georgia State University

Strands: Retention and Success, Improving the Quality of Education, Broadening participation, Research, Engaging Faculty

Abstract: CUREs (course-based undergraduate research experiences) have the potential to engage large numbers of diverse undergraduate students in authentic research, generating highly competitive, career-ready graduates. During this session, we will describe examples of CUREs at our respective institutions, and compare our strategies for expanding CURE offerings. The CURE Initiative launched in 2014-15 at Georgia State University is entering a phase of rapid, planned growth across six STEM departments. In Spring 2018, 18 Georgia State faculty formed a Teaching and Learning Community to develop CUREs via modules focused on assessment, alignment of student and research goals, course administration, and undergraduate mentoring. At Ohio State, faculty in the life sciences work individually with course and laboratory coordinators to develop CURES closely aligned with their research interests. In this roundtable, participants will discuss the key characteristics of successful CUREs and share perspectives on strategies for initiating a CURE program, expanding offerings, and impacting student outcomes.

The Ohio STEM Learning Network

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 1

Speakers: Heather Sherman, Education and Philanthropy, Battelle Memorial Institute; Kathie Maynard, College of Criminal Justice, Education, and Human Services, University of Cincinnati; Bob Midden, Northwest Ohio Center for Excellence in STEM Education, Bowling Green State University; Kate O'Hara, Teacher Education, Cleveland State University

Strands: Broadening participation, Partnerships Beyond the University

Abstract: The Ohio STEM Learning Network (OSLN) is a network of 44 state-designated STEM schools (K - 12) managed by Battelle Education - the philanthropic arm of the world's largest nonprofit research center, Battelle Memorial Institute. To receive STEM designation, schools are required to create meaningful partnerships with business, Industry, and university partners in their local communities. OSLN is divided into 7 regional hubs, with Battelle funded hub-director positions in each region. Hub directors connect STEM schools with industry, community, and higher education partners within each region, to ensure students have access to relevant, hands-on learning experiences. Several OSLN hub directors are co-located at higher education institutions. This panel discussion features hub directors from the University of Cincinnati, Cleveland State University and Bowling Green State University who will share examples of how they create and develop partnerships that benefit students in their communities from PK - 20.

STEM Teaching Assistants: Two Models for Supporting TAs in Learning, Valuing, and Implementing Evidence-based Instructional Practices

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 2

Speakers: Judith Ridgway, Center for Life Sciences Education, The Ohio State University; Lindsay Wheeler, Center for Teaching Excellence, University of Virginia; Erica Szeyller, Center for Life Sciences

Education, The Ohio State University; Jonathan Horn, Center for Life Sciences Education, The Ohio State University; Corrie Pieterson, Evolution Ecology and Organismal Biology, The Ohio State University

Additional Authors: Hannah Sturtevant, University of Virginia

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: With more faculty implementing evidence-based instructional practices in STEM, teaching assistants (TAs) have a unique and important role in ensuring the quality of undergraduate education. At our institutions, we have developed two different approaches to supporting STEM TAs in their instruction. At The Ohio State University, we have a prolonged professional development (PD) program that includes: (1) an individualized TA PD course, (2) TA meetings with embedded pedagogical training, (3) a learning community for TAs who teach course-based undergraduate research experiences, and (4) graduate teaching fellows positions facilitated by the university teaching center. At the University of Virginia, we have developed a novel, multi-tiered program that involves post-doctoral associates, educational developers, and disciplinary faculty in supporting cross-disciplinary STEM Teaching Methods course for TAs. In this round table, the group will discuss details of these programs and brainstorm ideas for improvement and ways to translate these programs to other institutions.

Collaborating to Improve STEM Teacher Preparation Statewide

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 3

Speakers: Edward Geary, Science, Mathematics, and Technology Education, Western Washington University; Stamatis Vokos, Physics, Cal Poly San Luis Obispo; Maile Hadley, Zeno Math;

Strands: Broadening participation, Partnerships Beyond the University, Institutional change

Abstract: A consortium of 2- and 4-year colleges and universities, K-12 schools/districts, NGO's, businesses, and government agencies is currently working together to improve science learning for all Washington State students by collaboratively transforming STEM teacher preparation programs across the state. This panel presentation will provide opportunities for participants to learn about, discuss, and explore: (1) the benefits and challenges of collaborating within and across institutions to improve STEM teacher preparation statewide, (2) resources, models, and drivers of change that can be leveraged to support organizational change and collaboration building in support of next generation STEM Teacher Preparation programs, and (3) barriers and strategies to increasing the recruitment, retention, and success of diverse STEM teachers.

A Center's Role in STEM Literacy

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 4

Speakers: Steven B. Case, Center for STEM Learning, University of Kansas; Pradeep (Max) Dass, Center for Science Teaching and Learning, Northern Arizona University; Michael Odell, College of Education/College of Engineering, University of Texas at Tyler;

Strands: Retention and Success, Improving the Quality of Education, Broadening participation

Abstract: Comprehensive Centers seek to fulfill a very ambitious mission: to improve STEM literacy for all people with work that fall into three broad categories: 1) secondary STEM teacher preparation and development, 2) undergraduate STEM course transformation for improved learning outcomes and, 3) and community engagement, outreach research and communication. Three UTeach co-directors will share how they have leveraged the connections of the UTeach STEM teacher preparation program to bridge all three areas of work within the context of their local academic community. Participants will emerge with knowledge of different models of implementation to accomplish the Center's mission.

Changing the Face of Supervision

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 5

Speakers: Kelli Wellborn, Student Success Center/Peer Tutoring - Science and Mathematics, University of Texas at Dallas; Christopher Stevens, Team Leader, University of Texas at Dallas;

Additional Authors: Christopher Stevens, University of Texas at Dallas

Strands: Managing a Center

Abstract: Supervising multiple tutors and centers can be time consuming and stressful. Peer Tutoring designed a model that assisted with dividing up supervisory responsibilities while integrating an ongoing training system for tutors, Team Leaders, and Learning Specialists. The ongoing training includes a weekly meeting that discusses content and development of personal and professional skills. During the presentation, we will discuss the new supervisory structure, training, roles of each position, and supervising the various groups and positions.

The REFLECT Project: Spreading Evidence-Based Teaching in STEM

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 6

Speakers: Stephanie Salomone, University of Portland

Additional Authors: Eric Anctil, Heather Dillon, Carolyn James, Valerie Peterson, and Tara Prestholdt, University of Portland

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: We all want our teaching to matter. This talk focuses on an attempt to make teaching matter more at one university. Redesigning Education For Learning through Evidence and Collaborative Teaching (REFLECT), an NSF-funded project underway at the University of Portland, is aimed at spreading the use of evidence-based pedagogical practices in STEM classes on campus. Participating instructors will first attend a week-long summer institute focused on active learning techniques and their potential benefits, and will collaborate in year-long reflective teaching cohorts while engaging in peer observation. This preliminary report summarizes what our grant team has learned so far about motivating and supporting

teacher change, reshaping institutional culture, leveraging internal resources, and utilizing external partners, and also analyzes a snapshot of current teaching practices on campus. We share a model for effecting widespread adoption of evidence-based instructional practices and changing campus culture that could be used at similar regional comprehensive universities.

Early College and STEM Academy: Strategies for Breaking the Generational Poverty Cycle in Rural America

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 7

Speakers: Gary E. Briers, Dept of Agricultural Leadership, Education, and Communications, Texas A&M University

Additional Authors: Kim D. Alexander, Roscoe Collegiate Independent School District; Glen C. Shinn, Global Consulting Solutions

Strands: Improving the Quality of Education, Broadening participation, Partnerships Beyond the University

Abstract: School-wide Early College--for ALL high school students at Roscoe Collegiate ISD (RCISD)--and STEM Academy designation have led to four private-public partnerships in STEM-related enterprises. More than 90% of RCISD's seniors complete an associate of science degree at high school graduation. Simultaneously, students earn industry-recognized certification in STEM fields as FAA-licensed UAV pilots, veterinary assistants, health care workers, welders, and/or computer technicians/network administrators. Because students earn a college parallel associate degree (versus an associate of applied science - often considered a "terminal degree"), graduates can and do continue to matriculate into STEM majors for baccalaureate degrees. These results are in a public school district with fewer than 30 graduates annually in a rural community of fewer than 2,000 residents. Two additional goals remain to be achieved: 90% of those associate degree/high school diploma recipients will earn baccalaureate degrees and 50% of those will earn a graduate or professional degree.

Significant Interest Group discussion: Educational pathways to career pathways

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 8

Speakers: John Rand, Office of STEM Education, University of Hawaii

Strands: Institutional change

Abstract: The national conversation seems to have shifted from educational pathways to career pathways. Are NSECs keeping up with this change and are the STEM faculty concerned or cognizant of this change? Is the role of the NSEC to get the student to graduation or must we look beyond to employment?

Reaching Tenure-Line STEM Faculty

Time: 4:30 PM on Thursday, June 7, 2018   **Location:** Round Table 9

Speakers: Gerhard G. Meisels, Coalition for Science Literacy, University of South Florida

Additional Authors: Valerie J. Harwood, University of South Florida; Robert L. Potter, University of South Florida; Scott Campbell, University of South Florida

Strands: Engaging Faculty, Institutional change

Abstract: TL faculty whose reward structure is based primarily on research are not very interested in expending the effort to acquire EBT skills. We get TL faculty aboard by integrally involving department chairs. The project leadership met individually with each of the six USF Science and Mathematics department chairs, asking what our project to foster adoption of EBT by TL faculty can do to reach such faculty and shape departmental culture. Three recommendations resulted: 1. free faculty time by providing assistance with routine functions such as grading. 2. provide assistance with developing appropriate EBT practices for courses that faculty members teach, and 3. Allow the chair to identify appropriate faculty members, and leave the selection criteria up to them. We will present details of conditions that led to the development of this strategy, of the selection of participating faculty, mentoring assistance, faculty selection, costs, and other operational details.

Managing Meaningful Employment of Undergraduates in STEM

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 1

Speakers: Johannes Strobel, SISLT & I.C.E. Lab, University of Missouri

Additional Authors: Olivia Hua, McGill University

Strands: Retention and Success, Partnerships Beyond the University, Managing a Center

Abstract: Undergraduate students are a highly motivated group of students: Students need to demonstrate transferable skills to grow either their research CVs or their application resumes for the next career move. The hiring, managing and mentoring of undergraduate students bring their own challenges and rewards. This workshop discusses advantages of working with undergraduate students in STEM centers, introduces tools and techniques on providing meaningful employment for undergraduate students and mentorship questions which need to be addressed. The model described has been tested and implemented at three research intensive universities and one cross-institutional lab.

Reinvigorating the Leadership of a Project to Promote Use of Evidence-based Teaching Strategies: or, How to Re-Engage an Influential but Busy Team

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 2

Speakers: Robert Potter, College of Arts and Sciences, University of South Florida

Additional Authors: Gerry Meisels, University of South Florida; Ruthmae Sears, University of South Florida; James Wysong, Hillsborough Community College; Eric Banilower, Horizon Research Inc.; Kevin Yee, University of South Florida

Strands: Partnerships Beyond the University, Engaging Faculty, Institutional change

Abstract: Sustaining engagement in projects led by teams invariably requires some form of regular re-invigoration. The NSF funded "STEER" project (Systemic Transformation through Evidence-based Education Reforms, NSF Grant DUE -1525574) was in this position in its third year. A ten-member leadership team of busy and influential faculty had become less team oriented and less focused on achieving the goals of the project. An externally facilitated retreat initiated an ongoing reflective process that identified changes needed both in project direction and team processes. We will discuss the key features that have allowed us to get back on track as a team, have increased effectiveness, and once again move the project forward

Developing Students' Essential Learning and Study Skills for Academic Success Within STEM Courses

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 3

Speakers: Charles Roberts, Dept. of Math, Science & Informatics, Mercer University, Penfield College

Additional Authors:

Strands: Retention and Success, Improving the Quality of Education, Broadening participation

Abstract: Students need a certain level of sill in critical thinking and problem-solving to succeed in their study within the STEM disciplines. In order to expand the pool of students who are prepared to study within these disciplines, it is often necessary to implement measures that allow STEM educators to develop and/or facilitate the development of concomitant skills AM ong the student population. Perhaps the most prominent AM ong them is the ability to communicate effectively. Additionally, the need for students to incorporate a myriad of highly successful learning and study strategies into their daily routines is urgent. Thus the success of any effort to induce the needed growth and development AM ong students could very well depend on the extent to which it is holistic, systemic, and culturally relevant. In this session a proven in-classroom technique will be demonstrated that is designed to successfully incorporate these features

Alumni Perspectives: Longitudinal Impacts of the Community College Internship (CCI) at Lawrence Berkeley National Laboratory

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 4

Speakers: Laleh Cote, Workforce Development & Education, Lawrence Berkeley National Laboratory; Graduate Group in Science & Mathematics Education, UC Berkeley

Additional Authors: Colette Flood, Lawrence Berkeley National Laboratory; Anne Baranger, UC Berkeley; Elisa Stone, UC Berkeley; Max Helix, UC Berkeley; Astrid Zamora, UC Berkeley

Strands: Retention and Success, Broadening participation, Assessment

Abstract: The Community College Internship (CCI) program is an undergraduate research experience (URE) for STEM majors at one of the 15 participating U.S. Department of Energy laboratories. We evaluated the outcomes of the CCI program at Lawrence Berkeley National Laboratory through surveys and interviews with alumni who participated in the program between 2009 and 2016. Surveys have given us insight into participants' original goals for applying, how the program may have impacted those goals, and if they have stayed in STEM. Contrary to the focus on training a technical STEM workforce (who obtain a terminal A.S. degree or other 2-year certification), we have found that the community college students who participate in our programs have goals that are very similar to those held by the 4-year students we encounter. There are major differences in the exposure 2-year students have to the "research world", in addition to their confidence level and understanding about how to be successful in the pursuit of a career in STEM. But ultimately, we are seeing that these students have similar goals, and they go on to achieve similar success, and these results indicate that perhaps we should be providing more resources to UREs geared toward community college students.

Participatory Action Research Experiences for Undergraduates: Exploring Challenges and Opportunities of a Coordinated Approach

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 5

Speakers: Laura B. Sample McMeeking, STEM Center, Colorado State University

Additional Authors: Carlie D. Trott and Andrea E. Weinberg, Colorado State University

Strands: Retention and Success, Broadening participation, Research

Abstract: Undergraduate research experiences (UREs) are high-impact practices designed to engage students in authentic learning within the context of cutting-edge research. Participatory action research (PAR), a methodology for bringing unheard voices into the public sphere, brings researchers and community members together in the pursuit of knowledge to create change. Our exploratory evidence suggests that using a PAR approach in URE programming can improve students' science communication skills, interdisciplinary capacities, and comprehension of research addressing real-world problems. UREs are typically limited in duration and often rely on faculty-directed projects and predetermined research questions, whereas PAR requires prolonged engagement and a collaborative, community-driven research process. These contradictory approaches can create practical challenges in planning and implementing PAR-based UREs, making their highly beneficial outcomes for students, communities, and science seem unattainable. In this roundtable, we facilitate a discussion on the challenges and opportunities of this promising new approach to UREs.

Learning Outcomes...Administrative Artifacts or Tools for Instructor and Student Metacognitive Practice?

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 6

Speakers: David Sovic, Center for Life Sciences Education, The Ohio State University

Strands: Retention and Success, Improving the Quality of Education

Abstract: In this roundtable discussion, we will consider course learning outcomes (CLOs) and examine their current use by instructors, as well as the additional value they may hold as tools to improve instruction and enhance student learning. While a wealth of information is available describing how to effectively write CLOs and when to use them during the instructional design process, little is known about their utility while conducting a course. To what extent do different instructors integrate CLOs into instruction? What are the best practices in disseminating CLOs to students? How do students perceive CLOs and their potential value as tools for achieving academic success? We will discuss ongoing research into the relationship between student use of CLOs as metacognitive tools and CLO achievement, as well as associations between instructors' integration of CLOs into instruction and student perceptions of their value.

The Role of the Center in Promoting Equity and Inclusion

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 7

Speakers: Donna Llewellyn, Institute for STEM and Diversity Initiatives, Boise State University

Strands: Broadening participation, Institutional change

Abstract: The issues of equity and inclusion on our campuses have become more central with the current events around the country. What is the role of the STEM Ed Center in these "centering" conversations - how can we help to facilitate dialogue and policy/practice change at our institutions? Come to this roundtable to hear about what we are doing at Boise State, to share what you are doing at your institution, and to discuss how we can help each other.

Defining Transferrable STEM Skills for Mathematics and Science Classrooms

Time: 11:30 AM on Friday, June 8, 2018   **Location:** Round Table 8

Speakers: Eddie Partida, Teacher Education Department, Claremont Graduate University

Additional Authors: Delacy Ganley, Claremont Colleges STEM Initiative, Co-P.I. ; Adam Landsberg, Claremont McKenna College, Scripps College and Pitzer College Claremont Colleges STEM Initiative, Co-P.I.

Strands: Partnerships Beyond the University, Engaging Faculty

Abstract: Providing K-12 students with integrated and engaging curriculum that teaches them the problem-solving skills used by STEM professionals is an educational priority. One challenge to delivering this type of curriculum is that math and science teachers often have limited experience and/or receive little training in problem-solving approaches used outside of their core discipline. Furthermore, teacher certification standards require teachers to demonstrate basic subject-matter competency; however,

there is no provision requiring teachers to know much beyond their disciplinary silos. This is problematic given the benefit that integrated approaches have on student learning and student interest in STEM. The Claremont Colleges STEM Initiative (CCSI) is a NSF-funded project conceived around the notion of Transferrable STEM Skills. In this presentation, we define Transferable STEM Skills and describe a series of courses developed by STEM and Education Faculty to help teachers teach these valuable skills to their students.

Promising Practices of STEM Resource Centers

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 1

Speakers: Todd Wackerman; Sharon Locke, Center for STEM Research, Education and Outreach, Southern Illinois University Edwardsville; Allison Grabert, Southwest Indiana Science, Technology, Engineering, and Mathematics (SwISTEM) Resource Center, University of Southern Indiana

Strands: Retention and Success, Partnerships Beyond the University

Abstract: STEM Education Centers can serve as a hub of community outreach and as support for broader impacts of research on campus. This panel explores sites that have begun providing materials and equipment lending and repository services to their campuses, regional schools, and other organizations in their communities. Topics addressed will include how to begin developing and providing service offerings, different models for delivery and upkeep, mitigating costs and risk, and supplemental resources to ensure that services are appropriately accessible to off-campus users.

Fostering Grassroots Academic Reform through a Community of Practice in Equity and Privilege

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 2

Speakers: Wilella Burgess, Evaluation and Learning Research Center, Purdue University

Abstract: Despite concerted efforts by institutions to reform teaching, provide better student services, and intentionally strive for a student body that reflects the greater population, attainment gaps based on socio-economic status and ethnicity is growing. Many traditional approaches to diversity and inclusion focus on assimilating low-income and under-represented groups into the current academic culture. The focus is generally on "fixing" students to make them fit into the existing academy – rather than examining the systemic patterns within that culture that create and perpetuate inequality. In December 2015, a group of faculty, staff, and graduate students from STEM departments and centers, as well as from liberal arts came together to create a grassroots Community of Practice in Equity and Privilege at Purdue. This group seeks to overcome hidden values and models within higher education, particularly STEM, that perpetuate inequity. Group members believe that faculty, as stewards of academic culture, have the agency to affect culture in ways that can positively impact student learning and experience. The Community of Practice meets regularly to share ideas and experiences, learn together through common reading and invited speakers, and support one another in the quest to become more equitable educators. This presentation will describe this community of faculty and staff who aspire to diversity and

equity in education through a process of transformation and shared practices that support personal and systemic change.

Using Teaching Portfolios to Engage Faculty in Improving Student Learning

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 3

Speakers: Jennelle Malcos, The Center for Excellence in Science Education, The Pennsylvania State University; Jackie Bortiatynski, The Center for Excellence in Science Education, The Pennsylvania State University;

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: The Center for Excellence in Science Education (CESE) at Penn State was challenged with the questions "How engaged are our students in the classroom?" with the follow-up "How do we provide professional development to our faculty IF engagement in lacking?" The driving force of these questions is that active learning and evidence-based teaching strategies increase learning gains. We are tackling these questions through a multifaceted observation endeavor to not only better understand our students experiences, but to develop teaching portfolios that can be used to guide a faculty member in professional development. During Phase 1, we are gathering baseline data using classroom observations, faculty member self-reporting, holistic peer evaluations and student evaluations (SRTEs). In our roundtable discussion, we will share the hurdles we overcame to gain departmental participation in the project, steps to develop a modified protocol from COPUS and pilot portfolios created from analyzing initial data.

The Impact of Network Participation on Local STEM Reform: Lessons Learned from CIRTL

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 4

Speakers: Lucas Hill, University of Wisconsin-Madison

Additional Authors: Jessica Schein, Michigan State University; Julia N. Savoy, University of Wisconsin-Madison

Strands: Research, Partnerships Beyond the University, Institutional change

Abstract: Despite the prevalence of multi-institutional reform networks, little is known about their impact on participating organizations and how local institutional features intertwine with national participation to advance reform goals. The purpose of this session is to present research findings from one example of a long-standing, multi-institutional initiative, the Center for the Integration of Research, Teaching, and Learning (CIRTL). The CIRTL Network is a NSF-funded network of 41 research-intensive universities that seeks to improve undergraduate STEM education through future faculty preparation. The session will include four parts. First, we will discuss several types of institutional impact resulting from CIRTL membership. Second, we will review findings about the impact of CIRTL on individuals. Third, we will talk about local campus features and conditions that promote or facilitate Network impact. To conclude, we will lead a discussion with attendees about lessons learned and the ways our research is applicable to NSEC members.

Faculty Professional Development Offered Four Ways

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 5

Speakers: Judith Ridgway, Center for Life Sciences Education, The Ohio State University; Caroline Breitenberger, Center for Life Sciences Education, The Ohio State University; Amy Kulesza, Center for Life Sciences Education, The Ohio State University; David Sovic, Center for Life Sciences Education, The Ohio State University

Strands: Improving the Quality of Education, Engaging Faculty

Abstract: We will describe four instructor professional development (PD) opportunities designed to engage faculty and support outstanding undergraduate biology education. The opportunities include: (1) individualized coaching for backward course design, (2) post-term assessment data review, (3) lecturer fellowships for contract instructors of record, and (4) a Summer Institute based on the National Academies Scientific Teaching Model. In addition, we will lead a discussion in which participants will share their own instructor PD practices, develop ideas of how they may use or modify the instructor PD opportunities in their context, and identify action items to implement new ideas in their centers.

The Care and Feeding of K-12 STEM Teachers

Time: 2:30 PM on Friday, June 8, 2018   **Location:** Round Table 6

Speakers: Jessica Dwyer, Center for Science and Math Education, University of Utah

Strands: Improving the Quality of Education, Broadening participation

Abstract: The University of Utah CSME's in-service K-12 teacher training programing builds teachers' content expertise and pedagogical content knowledge towards propagating equitable instruction. Teacher retention literature asserts, however, that teachers leave the classroom not due to lack of technical preparation, but rather due to emotional exhaustion, structural impediments to cohesive instruction, and a lack professional support. As the CSME strives to impact classroom teachers' career longevity, our programming is now incorporating techniques from organizational psychology, social work, and business-oriented disciplines to increase teachers' leadership capacity, team facilitation, and socio-emotional regulation. For example, our Elementary STEM Endorsed cohort continue as Teacher Leaders who build both self-care plans and relationships with legislators. As we begin to blur these disciplinary lines, we wonder; what is our role in engaging teachers in components of practice that fall outside of our STEM content focus, but are inarguably connected to teachers' ability to persist in challenging instructional contexts?

Active Learning in Introductory Chemistry: A Research Partnership

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 1

Speakers: Kathy Asala, Department of Chemistry, UNC Charlotte; David Pugalee, Center for STEM Education, UNC Charlotte

Strands: Improving the Quality of Education, Research, Institutional change

Abstract: Findings from a scholarship of teaching partnership focused on active learning will be highlighted. The research was a partnership between a STEM education center and faculty in the chemistry department. The session will include an overview of this research collaboration and key findings of the qualitative component of this mixed-methods study. Findings will focus on challenges and opportunities emerging from the analysis of the instructor reflective interview and the student focus-group interviews. Opportunities include in-class components and out-of-class components of the active learning implementation in an introductory chemistry course. Challenges include risks taken in implementing change and problems encountered in implementation. These findings highlight how active learning pedagogical strategies can provide better learning opportunities for students than traditional lecture- based instruction. Next steps taken by the Department of Chemistry underscores the relative importance of partnerships between STEM faculty and STEM education researchers.

Family Learning and Outreach in Engineering and Science

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 2

Speakers: Amanda M. Gunning, Center for STEM Education, Mercy College; Meghan E. Marrero, Center for STEM Education, Mercy College

Additional Authors: Meghan E. Marrero, Professor / Co-Director, Mercy College, Center for STEM Education

Strands: Broadening participation, Partnerships Beyond the University

Abstract: The bilingual FLORES Education program (offered in both English and Spanish) integrates STEM content for lower elementary students who are low-income and racially or ethnically diverse. The goal of this program is to advance STEM discovery and understanding in young elementary students while exploring the role of parental involvement. FLORES has been implemented several times with great success and the model is expanding. According to the framework of Hoover-Dempsey, et al (2005), parents who understand what they can do to encourage and support learning in STEM disciplines for their young children will be able to convey a sense of confidence that builds self-efficacy in their children. FLORES involves parents in STEM learning, through dinner meetings, which lead all attendees in interactive STEM activities, in an informal, congenial setting with follow-up projects to take home. Join us to learn about our research and how to present FLORES in your community.

Biology Teaching Assistant Project (BioTAP 2.0): A Network to Build a Capacity for Collaborative Research on Biology Graduate Teaching Assistant Teaching Professional Development (GTA TPD)

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 3

Speakers: Gili Marbach-Ad, CMNS Teaching and Learning, University of Maryland; Judy Ridgway, Ohio State University

Additional Authors: Grant Gardner, Middle Tennessee State University; Kris Miller, University of Georgia; Elisabeth Schussler, University of Tennessee-Knoxville

Strands: Retention and SuccessResearch, Engaging Faculty

Abstract: BioTAP 2.0 is a NSF funded Research Coordination Network grant with the goal to build capacity for collaborative research on biology graduate teaching assistant teaching professional development (GTA TPD). By helping practitioners assess their own programs, and work with others to compare assessments across institutions, the network will build the empirical data necessary to make data-driven decisions about programmatic practices. The year-long BioTAP 2.0 Scholars program leads selected cohorts of interested stakeholders through the process of designing and engaging in a scholarly research project on some aspect of a biology GTA TPD. We present the goals and accomplishments of BioTAP 2.0 to date, including data from a national survey on GTA TPD efforts, and information about the Research Development Sessions and Virtual Learning Communities, which are components of the BioTAP 2.0 Scholars Program. We will also share experiences from the first RDS meeting.

A Case Study Describing The Transformation Process of Faculty Members Adopting Learner-Centered Teaching Methods

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 4

Speakers: Gili Marbach-Ad, CMNS Teaching and Learning, University of Maryland

Additional Authors: Carly Hunt, University of Maryland

Abstract: We used a case study approach to obtain an in-depth understanding of the change process of two instructors who were redesigned a biology course. There is a critical need to understand how biology instructors transition from teacher-centered teaching towards learner-centered teaching. Using the innovation-decision model for change, we explored the motivation and decision-making and reflective processes of the two instructors through two consecutive, large-enrollment biology course offerings. Our data reveal that the change process is somewhat unpredictable, requiring patience and persistence during inevitable challenges that arise for instructors and students. For example, the change process requires instructors to adopt a teacher-facilitator role as opposed to an expert role, to cover fewer course topics in greater depth, and to give students a degree of control over their own learning. Students must adjust to taking responsibility for their own learning, working collaboratively, and relinquishing the anonymity afforded by lecture-based teaching.

Takeaways From the Development and Piloting of a New 12th Grade Math Course and Related Long-term Professional Development Project

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 5

Speakers: Lipika Deka, Mathematics and Statistics, California State University, Monterey Bay; Dennis Kombe, Department of Education and Leadership, California State University, Monterey Bay

Strands: Partnerships Beyond the University

Abstract: This presentation discusses a collaboration between STEM faculty, educational administrators, and high school mathematics teachers. Jointly these colleagues developed a new 12th grade mathematics course for seniors deemed not yet college ready in mathematics and provided professional development focused on instructional strategies to deepen student understanding of mathematics. Building on research that underscores the role long-term, mathematics-focused professional development plays in efforts to improve teachers' knowledge (Deglau & O'Sullivan, 2006), this project challenged teachers to: explore new content through the modeling of authentic mathematics problems; expand their pedagogical strategies to include more active learning, problem solving and technology; promote a shift in teachers' mindset (Dweck, 2007); and, develop teachers' capacity to facilitate productive mathematical discussions (Smith & Stein, 2011). We will discuss successes and challenges encountered with the course and professional development.

STEM Teacher Professional Development

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 6

Speakers: Debbie Jackson, STEMM Education Center, Teacher Education, Cleveland State University; Kate O'Hara, STEMM Education Center, Teacher Education, Cleveland State University

Strands: Partnerships Beyond the University

Abstract: The CSU STEMM Education Center maximizes resources by collaborating with the STEM high school located on our campus. The teachers at MC2STEM High School use innovative teaching methods including project-based instruction. The Head of School and professors from CSU co-created a professional development series for K-12 teachers around project based instruction. The lead STEM teachers from the high school continue to co-facilitate professional development throughout northeast Ohio. This serves as an income stream for the center and develops teacher leaders at the high school. In addition, the work has resulted in changes in the project-based instruction course that is required for all pre-service teachers seeking an adolescent/young adult license in any content area. This professional development model strengthens the professional development for area schools, improves high school teachers' leadership abilities and informs our teacher preparation programs. We hope to continue to expand the offerings of professional development in the future.

Mercer University STEM/STEAM Partnerships with Stakeholders: Schools, Communities, and Industry

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 7

Speakers: Zipangani Vokhiwa, Maths, Science, and Informatics (MSI), Mercer University

Strands: Partnerships Beyond the University

Abstract: Participants will discuss the current strategic direction in STEM/STEAM at Mercer University, which includes the establishment of a full-fledged STEM Center, professional development for teachers, STEM Education Innovation Laboratory, and other STEM/STEAM activities. These initiatives are helping to position Mercer University in its vision to become a leader in Georgia's STEM education. In addition, the participants will further discuss special programs that Mercer is currently undertaking, such as the STEM Camp for Girls, K-20 Center for STEM Faculty Fellows, Tutorial Assistance Network (TAN) Program, Supplemental Instruction (SI) model in STEM general education, Coordinated Volunteering in STEM academies and Participation in local and regional Science Olympiads and Faculty-led undergraduate research projects and activities in STEM disciplines for adult students in Penfield College and Ag STEM Center in the Dominion Republic, Sandy Spring Education Force STEAM Showcase, STEM Exploration Expo, the K - 12 STEM endorsement for in service teachers for Tift College of Education. These STEM initiatives include a collaborative effort with schools, communities, and industry. The intention of all these initiatives at Mercer University is to enhance and empower adult students with the skills and competencies to be effective and efficient in the application and practice in STEM fields of study for their future careers.

Changes in Majors-Level Introductory Biology Student Content Knowledge and Motivation Associated with Participation in Peer-Led Team Learning

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 8

Speakers: Sara Faust, Center for Life Sciences Education, The Ohio State University

Strands: Retention and Success, Broadening participation, Research

Abstract: The Center for Life Sciences Education at The Ohio State University began offering Peer-Led Team Learning (PLTL) to majors-level introductory biology students in 2014 in response to upper-division STEM instructors reporting the need to reteach introductory concepts and data indicating an achievement/persistence gap between underrepresented minority and majority group students. Our large introductory biology courses address a broad range of concepts with limited student/instructor interaction, which may cause students to feel disconnected from material and lack confidence. Literature shows PLTL to be effective in improving student scientific literacy, depth of learning, and STEM retention. PLTL workshops use student-centered metacognitive strategies to help students self-evaluate and correct their conceptual knowledge, scientific literacy, and critical thinking abilities. We will describe our implementation of PLTL, share our results, and discuss the study's implications for large introductory biology courses.

Factors that Impede the Success of Centers

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 9

Speakers: Christopher Andersen, Patton College of Education, Ohio University

Strands: Managing a Center

Abstract: The proposed poster provides a multiple case study of three consecutive attempts to establish and maintain a STEM education center at a large Carnegie "Doctoral Universities: Highest Research Activity" land-grant institution. Despite broad stakeholder support and strong external funding, all three attempts ultimately failed. This study is unusual in being able to draw comparisons within a single institution, which allows examination of the three attempts' contrasting missions, funding models, and administrative structures while eliminating institutional variables that would confound comparisons involving different universities. Though resources like the NSEC STEM Education Center Toolkit provide guidance concerning best practices, the proposed poster serves as an example of research with negative results, which provides insight into unexpected factors that impeded the success of the centers.

National Collaborative for Research on Food, Energy, and Water Education

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 10

Speakers: ; Nicole Sintov, The Ohio State University

Additional Authors: Cory Forbes, University of Nebraska-Lincoln; Hannah H Scherer, Assistant Professor, Virginia Tech; Hui-Hui Wang, Assistant Professor, Purdue University; Kelly F. Millenbah, Professor and Associate Dean, Michigan State University; Nicole Sintov, Assistant Professor, The Ohio State University; Christine Li, Assistant Professor, University of Missouri

Strands: Improving the Quality of Education, Research, Partnerships Beyond the University

Abstract: There is a need for a sustained, systemic, and interdisciplinary education and outreach initiative, including program evaluation and education research, focused on education in the Food-Energy-Water-Nexus (FEW-Nexus). This proposal focuses on a growing network of discipline-based education researchers involved in educational programs and research grounded in the FEW-Nexus. The recently-established Collaborative for Research on Food, Energy, and Water Education will serve as a nucleus for transdisciplinary efforts to 1) advance FEW education efforts; 2) foster FEW education research; and 3) enhance collaboration around FEW education and education research. This presentation reports on outcomes of a recent national invited conference involving a diverse array of educators and education researchers working in the FEW-Nexus domain. We discuss an emergent and developing vision for NC-FEW and future plans for cultivating this network in an effort to address FEW issues worldwide through effective, research-based educational methods and interventions.

Towson University Research Enhancement Program (TU-REP)

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 11

Speakers: Cynthia Ghent, STEM Education Center, Towson University

Strands: Broadening participation, Assessment, Engaging Faculty

Abstract: Towson University's Research Enhancement Program (TU-REP) is a project funded by an HHMI (Howard Hughes Medical Institute) Inclusive Excellence grant. In its first year at TU, the program focused on development and delivery of course-based undergraduate research experiences (CUREs) and a faculty professional development program focused on inclusive teaching and CURE pedagogy, development, and delivery. The preliminary evaluation plan of the project involves data collected from students, courses, and faculty, in an effort to respond to three research questions, all of which investigate CURE course development and implementation, as well as beliefs of students and faculty about CURE course practices and inclusive teaching. Spring 2018 was the pilot semester for the program evaluation, the results of which are reported here.

Using a Digital Learning Lab to Improve Biology Education at MIT and Online

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 12

Speakers: Darcy G. Gordon, Biology, Massachusetts Institute of Technology

Additional Authors: Swati B. Carr, MITx Biology Digital Learning Lab Fellow, Massachusetts Institute of Technology; Mary Ellen Wiltrout, MITx Biology Digital Learning Lab Scientist, Massachusetts Institute of Technology

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: The advent of Massive Open Online Courses (MOOCs) catalyzed an increased application of the learning sciences and digital technology to improve MIT student experiences and instructional effectiveness. The Digital Learning Lab (DLL) members (DLL Scientist and Fellows) in Biology apply their biology PhDs and experience in the learning sciences, technology, and project management to collaborate with faculty to enhance learning in on-campus courses, and develop online activities and MOOCs. Their deliberate curriculum design that aligns course elements and promotes core scientific competencies through active learning is ultimately facilitated through the use of digital technology. Through the resulting feedback loop, on-campus and MOOC experiences inform best practices for digital and hybrid learning, and further discipline-based educational research. A Biology DLL Fellow will discuss lessons learned from the DLL model as an innovative improvement of biology instruction in higher education and their applicability to STEM education centers with different needs.

Deliberative Democracy

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 13

Speakers: Gwen Shusterman, Chemistry - STEM Education and Equity Institute, Portland State University

Additional Authors: Regis Komperda; Kathryn N. Hosbein; Jack Barbera, Professor; Erin Shortlidge, Assistant Professor; Gwen Shusterman, Professor, Portland State University

Strands: Retention and Success, Improving the Quality of Education, Assessment

Abstract: Deliberative democracy (DD) is an active learning approach to integrating science content with relevant real-world issues. During DD exercises, students evaluate information from peer-reviewed scientific and media articles, deliberate in groups, and arrive at an evidence-supported consensus on how science can be used to address a real-world issue. At Portland State University, DD has been implemented in large-enrollment courses in biology, chemistry, and physics as part of an ongoing five-year Howard Hughes Medical Institute (HHMI) science education funded project. The goals of DD include helping students make connections between the course content and the science in their lives, improving students' scientific literacy, and encouraging the development of discourse skills. This research investigated how implementation of DD influenced students' perceptions of science and confidence interpreting scientific material. Data will be presented on DD implementation in biology, chemistry, and physics courses.

Gateways-ND: Producing Institutional Change through STEM Faculty Engagement

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 14

Speakers: Jill M. D. Motschenbacher, Office of Teaching and Learning, North Dakota State University

Additional Authors: Motschenbacher, J.M. and Kelter, P.B., North Dakota State University

Strands: Improving the Quality of Education, Engaging Faculty, Institutional change

Abstract: Gateways-ND is a five-year (2015-2020) National Science Foundation (NSF)-funded faculty and instructional staff development program that offers support in learner-focused teaching practices to STEM educators at North Dakota State University (NDSU). Gateways-ND has changed, and is changing, the culture of STEM education throughout NDSU. In 2015, student retention and graduation rates persistently lagged behind those of peer institutions, and faculty, students and alumni were dissatisfied with the level of academic support, instructional quality, and student engagement in gateway STEM courses at NDSU. Over the past three years, Gateways-ND has made monumental changes in teaching and learning practices and beliefs among NDSU faculty, staff, and administration. Overall, classes are becoming more active for students through reduced lecture time and increased group work, student retention rates are decreasing, and grades are increasing. These changes will ultimately influence NDSU graduates as they tackle economic and social questions that impact society as a whole.

EPIC Science Education at James Madison University: Expanding Pathways, Identity and Capacity (EPIC) in Secondary Education

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 15

Speakers: Kerry Cresawn, College of Science and Mathematics and College of Education, James Madison University

Additional Authors: Barbara A. Reisner, Department of Chemistry and Biochemistry, James Madison University; Scott A. Paulson, Department of Physics and Astronomy, James Madison University; Eric J. Pyle, Department of Geology & Environmental Science, James Madison University; and Robbie Higdon, College of Education, James Madison University

Strands: Retention and Success

Abstract: Like many institutions, the number of pre-service science teachers at James Madison University has decreased relative to the total number of undergraduate students. Faculty from the College of Science and Mathematics and the College of Education have collaboratively developed strategies to increase the number of students who persist in obtaining licensure in science education and bring new students into the program through alternative pathways. Using funds from a capacity-building NSF Noyce grant, we have developed new courses, summer experiences, and academic year experiences that provide additional ways for JMU undergraduates to work with middle and secondary school students. We have also developed new, sustainable routes into the secondary education minor and have reworked existing coursework to build participants' science teacher identity. We have leveraged institutional supports including Admissions, Marketing and Outreach & Engagement to increase awareness of our program. Successes and challenges in implementing these EPIC strategies will be reported.

E-FT^2: Faculty Teaching Faculty about Teaching in the School of Engineering

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 16

Speakers: Kumiko Haas, Office of Instructional Development, UCLA

Additional Authors: Michelle Gaston, Assistant Director of Teaching and Learning Initiatives, Office of Instructional Development, UCLA; Adrienne Lavine, Faculty Director of the Office of Instructional Development and Professor of Mechanical and Aerospace Engineering, UCLA;

Strands: Improving the Quality of Education, Engaging Faculty

Abstract: A quarter-long workshop series was developed in a collaborative effort between the School of Engineering and Applied Science and the Office of Instructional Development (OID) at UCLA. The program titled "FT^2: Faculty Teaching Faculty about Teaching" was designed to build a community of practice supporting faculty in creating an atmosphere that values teaching within the School. Each workshop was led by faculty who are regarded as leaders within the School on teaching and co-developed by the faculty and OID consultants. The primary goal of the program was to support new faculty as they develop their first courses. A secondary goal was to provide support for all faculty

interested in improving student learning through better pedagogy. The collaboration allowed the workshop to have a foundation in evidence-based pedagogy as well as credibility with the faculty as the workshops were led and created by engineering faculty with concrete examples in the discipline.

Operation STEM

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 17

Speakers: Susan D. Carver, STEMM Education Center/Mathematics, Cleveland State University

Additional Authors: John P. Holcomb, Jr., Associate Dean of College of Sciences and Health Professions, Cleveland State University; Debbie Jackson, Associate Professor, Teacher Education, Cleveland State University; Andrew Resnick, Assistant Professor, Physics, Cleveland Sta

Strands: Retention and Success, Improving the Quality of Education

Abstract: Operation STEM seeks to provide STEM-centered and directed transdisicplinary educational opportunities for students who are low income (over 66% of undergraduates are Pell-eligible), first generation (42% of first time full time freshmen), and racially diverse (22% of undergrads are African American and 4% are Hispanic) through transforming a current "choke point" of mathematics success. Operation STEM serves STEM majors by forming a cohort of students starting with a two-week summer bridge program, offering mandatory supplemental learning sessions, and providing extracurricular STEM-related activities to build content knowledge and social capital among vulnerable students during precalculus and calculus courses. The purpose of Operation STEM is to increase retention and graduation among low-income, underrepresented minority, and first-generation college students using a variety of interventions that are well-known to increase persistence. In addition to providing support, it creates an interdisciplinary STEM cohort group that participates in social, academic, and STEM-related cohort activities together.

The STEM Education Innovation and Research Institute (SEIRI) at IUPUI

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 18

Speakers: Justin L Hess, SEIRI (STEM Education Innovation & Research Institute), IUPUI; Pratibha Varma-Nelson, SEIRI (STEM Education Innovation & Research Institute), IUPUI

Strands: Improving the Quality of Education, Engaging Faculty, Managing a Center

Abstract: This roundtable discussion will feature Varma Nelson (Founding Executive Director) and Hess (Assistant Director) of the STEM Education Innovation and Research Institute (SEIRI) at IUPUI. SEIRI's mission is to advance the state of the art of STEM education research and innovation across IUPUI's campus and beyond. This roundtable will discuss various strategies and initiatives that SEIRI has begun implementing to promote excellence in STEM education research and practice. Specifically, we hope to gather feedback from the community on these efforts. The primary topic of interest will be managing an institute, such as SEIRI, that seeks to realize these aims through multiple objectives. Discussion topics

include: -Establishing faculty partnerships and collaboration in institute objectives -Implementing change efforts that involve the distribution of awards or small grants -Promoting an institutional culture that values Discipline-Based Education Research -Establishing the reputation of an institute through marketing, communication, and branding.

Active Learning Initiative: Using COPUS to Study Changes in Teaching Practices Over Time

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 19

Speakers: Carolyn Aslan, Cornell University

Additional Authors: Lisa Sanfilippo, Cornell University

Strands: Improving the Quality of Education, Assessment, Research

Abstract: The Active Learning Initiative at Cornell University provides grants and support to departments in redesigning their courses to implement research-based active learning strategies to support student learning. To date, ten courses have been redesigned as part of this program. Most of these courses are large introductory level STEM courses with between 100-400 students. One of the goals of this initiative is to support sustainable changes in the implementation of active learning teaching strategies, which hopefully will persist as courses are taught by different instructors. One way we are documenting the changes in teaching practices over time is through structured class observations using the Classroom Observation Protocol for Undergraduate STEM (COPUS), which was developed by Michelle Smith and Carl Wieman (Smith et al. 2013). This poster will show comparisons of different semesters of a course using the COPUS instrument and whether the amounts of active learning strategies have changed over time.

Making science real through community action: integration of service learning in an introductory-level course at the University of the Virgin Islands

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 20

Speakers: Michele Guannel, University of the Virgin Islands, St. Thomas

Additional Authors: Michelle Peterson, Associate Professor, University of the Virgin Islands, St. Croix Joan Ledbetter, Academic Advisor II, University of the Virgin Islands, St. Croix Imani Daniel, Community Engagement Specialist (University of the Virgin Islands, St. Tho

Strands: Improving the Quality of Education, Broadening participation, Research

Abstract: Service learning is a prime example of culturally relevant pedagogy: it connects science to everyday life and therefore is a powerful instructional tool for freshman-level students. In September 2017, the United States Virgin Islands experienced two unprecedented, devastating Category 5 hurricanes, Irma and Maria. At the University of the Virgin Islands, we developed and implemented a pilot project to integrate service learning within Science 100, a course on natural disasters and ecosystems of the Caribbean. Twelve students chose to conduct hurricane recovery work with

community organizations, or public outreach about marine conservation. Here, we present qualitative analysis of the impacts of service on students and phenomenological themes from student essays written about their hurricane experiences. As we expand the project for future semesters, we hypothesize that service learning within Science 100 will develop "21st Century Skills" (creativity, communication, critical thinking, and collaboration), enrich course content, and build greater community resiliency.

Strategies for Building a Community of Undergraduate STEM Pre-Service Teachers

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 21

Speakers: Jessica S. Krim, Southern Illinois University Edwardsville

Additional Authors: Sharon Locke, Director of the Center for STEM Research, Education, and Outreach, Southern Illinois University Edwardsville

Strands: Retention and Success, Improving the Quality of Education, Broadening participation

Abstract: Through grants from the National Science Foundation's Robert Noyce Scholarship Program, SIUE is providing intensive pre-service experiences for science and math majors who plan to become certified teachers and have committed to teach in high-needs schools. Junior and senior Noyce Scholars participate in monthly seminars during the academic year with highly qualified practicing teachers, exploring complex topics such as student motivation, race, poverty, and interactions with parents.. Scholars conduct research in their STEM discipline or tutor at a community college while also completing an early intensive teaching experience, prior to their formal student teaching. Summer internships with community organizations help draw STEM-interested freshmen and sophomores to teaching by providing opportunities for them to try informal teaching and earn digital badges in recognition of their accomplishments. Ongoing evaluation of the program uses a self-efficacy framework and seeks to understand the roles various experiences play in shaping participants' views of teaching.

Partnering K-12 Schools with Universities: Building Community through Family STEM Nights

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 22

Speakers: Shande King, University of Tennessee, Knoxville

Strands: Improving the Quality of Education, Broadening participation, Partnerships Beyond the University

Abstract: Learn to develop a school-wide mathematical community by partnering with your local university to host a regular family STEM night. Research shows that family engagement with mathematics and science learning encourages student learning and interest in STEM areas. Family STEM nights have proven a successful avenue to invite parents and other community members into the schools to promote critical thinking and student interest in these areas. Planning and implementing a family STEM night may seem daunting, but you can learn to partner with your local university and/or

STEM education center to consider the necessary plans in preparation for your STEM night, as well as the materials and physical labor required to make your STEM night a success. These partnerships provide greater access to higher education in STEM areas, as well as fosters a sense of community among STEM learners from young K-12 learners to university STEM education center leaders.

The STEMcoding Project: Bringing the Hour of code to the Science Classroom

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 23

Speakers: Chris Orban, Ohio State University

Additional Authors: Richelle Teeling-Smith, Professor, University of Mt. Union

Strands: Improving the Quality of Education, Broadening participation, Research

Abstract: Despite the success of code.org and the hour of code(TM), very little content currently exists to integrate coding into introductory STEM courses even though computer science is now designated as a "core subject". In fall 2017, the STEMcoding project released an hour of code activity (go.osu.edu/hourofcode) on the physics of video games and started a youtube channel (go.osu.edu/STEMtube). Importantly, a high percentage of the people featured in the videos come from underrepresented groups in STEM, and we try to ensure that it is mostly undergrads on screen, rather than professors or post-docs. This poster provides an overview of the coding resources that are freely available, summer training opportunities for teachers and future plans.

The Southern California Regional Collaborative: A Partnership of 2- and 4- Year Colleges

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 24

Speakers: Jess Gregg, UCLA

Additional Authors: Erin Sanders, Co-PI, UCLA Marc Levis-Fitzgerald, SoCal Regional Assessment Lead, UCLA

Strands: Broadening participation, Partnerships Beyond the University

Abstract: This poster will share successes, challenges, and insights from recent efforts to form a regional collaborative among 2- and 4- year institutions in an urban area. The goal of this collaborative is to promote a regional approach to STEM higher education success, particularly to support students and faculty from underrepresented groups. These efforts are part of an NSF INCLUDES design and development launch pilot, led by the Center for the Integration of Research Teaching and Learning (CIRTL).

A Large-scale Study of STEM Teaching Practices in North American Universities

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 25

Speakers: Paul J Wendel, Otterbein University

Additional Authors: Esson, J. M. (Otterbein University), Plank, K. M (Otterbein University), Stains, M. (University of Nebraska—Lincoln), Harshman, J. (Auburn University), Barker, M. K. (Simon Fraser University), Chasteen, S. V. (University of Colorado, Boulder), Cole, R. (University of Iowa), DeChenne-Peters, S. E. (Armstrong State University), Eagan, M. K. (University of California, Los Angeles), Knight, J. K. (University of California, San Diego), Laski, F. A. (University of California, Los Angeles), Levis-Fitzgerald, M. (University of California, Los Angeles), Lee, C. J. (University of California, Los Angeles, Lo, S. M. (University of California, San Diego), McDonnell, L. M. (University of California, San Diego), McKay, T. A. (University of Michigan), Michelotti, N. (University of Michigan),[10] Musgrove, A. (University of Calgary), Palmer, M. S. (University of Virginia)" Rodela, T. M. (University of Virginia), Sanders, E. R. (University of California, Los Angeles), Schimpf, N. G. (University of British Columbia), Schulte, P. M. (University of British Columbia), Smith, M. (University of Maine), Stetzer, M. (University of Maine), Van Valkenburgh, B. (University of California, Los Angeles), Vinson, E. (University of Maine), Weir, L, K. (St. Mary's University), Wheeler, L. B. (University of Virginia), Young, A. M. (Otterbein University)

Strands: Research

Abstract: STEM teaching practices were observed in 25 North American Universities using the COPUS classroom observation instrument. Over 2000 classes were observed across seven STEM disciplines, including 709 individual courses taught by 548 individual faculty members. Using latent profile analysis, observed instructional practices were grouped into three instructional profiles: 1) "Didactic," characterized by at least 80% of class time devoted to lecturing with student participation restricted to sporadic questions—55% of observations; 2) "Interactive Lecture," characterized by lecture supplemented with student-centered activities such as group work—27% of observations; and 3) "Student-Centered," characterized by incorporation of student-centered strategies into large portions of class time—18% of observations. Small class size and flexible classroom layout did not strongly predict student-centered practices, and at least four visits appear to be required to reliably characterize instructional practices.

Certificates in University Teaching for Students, by Students

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 26

Speakers: Jennifer E. Weaver, California Institute of Technology

Additional Authors: Kelsey M. Boyle, Graduate Student; Rebekah M. B. Silva, Graduate Student; Noelle R. B. Stiles, Graduate Student, and Daniel A. Thomas, Graduate Student, all at California Institute of Technology.

Strands: Improving the Quality of Education

Abstract: The Caltech Project for Effective Teaching is a group of graduate students and post-doctoral scholars dedicated to improving their own teaching skills and helping others to do the same. We offer two certificate programs: the Certificate of Interest and the Certificate of Practice in University Teaching. The Certificate of Interest is designed to introduce participants to various facets of teaching and learning through seminars and workshops, after which participants submit reflective journal entries. The Certificate of Practice is designed to assist participants in their evolution as instructors by providing a framework for their professional development in which they: learn about teaching pedagogy; apply effective methods in their teaching experiences; reflect and refine their teaching based on feedback; and develop a teaching philosophy. Our certificate programs are self-guided and directly overseen by two graduate student co-directors, thus giving students and post-doctoral scholars primary agency and opportunities for peer teaching and learning.

Student Motivation and Learning in a General Education Science Course Greatly Improved by Participation in Real Science Research Addressing a Community Need

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 27

Speakers: W. Robert Midden, Bowling Green State University

Strands: Retention and Success, Improving the Quality of Education, Assessment

Abstract: Five different instructional modalities were tested for their effects on student motivation, engagement, and learning in a general education science course for first-year undergraduates who were not majoring in the natural sciences. Assessment results indicate that the course taught with service learning that involved real science research was markedly more effective with all of these outcomes than the other instructional modalities: traditional lecture with a curriculum that was organized in a common topic sequence; lecture and problem solving with a contextualized curriculum in which the sequence of topics was determined by "big questions" that addressed relevant issues of current interest; students investigation of topics and issues of their choice through directed library research; and hands-on inquiry to promote mastery of selected chemistry concepts. Virtually all students consistently mentioned that it was the perception that they were doing something that could benefit others that they found most compelling.

STEM Outreach

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 28

Speakers: Phil Johnson, Appalachian State University

Strands: Partnerships Beyond the University, Engaging Faculty, Institutional change

Abstract: The primary function of the STEM Education Center at Appalachian State University is professional development in math and science for K-12 teachers. The poster will outline some of the other programs that work to engage the community in STEM activities. Especially highlighted will be the

annual science seminar series that is unique among the five STEM Education Centers in the University of North Carolina System.

Cross-College Collaborations for Building STEM-Focused Networks in K-12 Education

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 29

Speakers: Kathleen M. Hill, Pennsylvania State University

Strands: Partnerships Beyond the University

Abstract: The Center for Science and the Schools (CSATS) at Pennsylvania State University works collaboratively with scientists and engineers at Penn State and in industries to design, develop, and implement many outreach programs and workshops for K-12 education. Operating since 2004, our experience in STEM education programs and strong collaborations with researchers have enabled us to build meaningful interdisciplinary programs. CSATS partners with researchers from the six STEM colleges on grant-funded projects to provide one-day workshops, one-week programs, and immersive research experiences for K-12 teachers. Through extensive outreach efforts, we have been able to expand our reach to include teachers from 233 schools across 22 states. Ultimately, our programs seek to support teachers in preparing the future STEM workforce by providing learning experiences that engage students in the practices and thinking used by scientists and engineers.

Institutional Logics and Evidence-Based Instruction in STEM Higher Education

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 30

Speakers: Alejandro de la Puente, NSF

Strands: Research, Institutional change

Abstract: The need to transform education beyond the development, dissemination and adoption of better and more inspiring teaching practices requires fundamental changes in the practices and cultures of universities. It requires a framework to create and sustain those changes. To bolster those changes, legitimizing Evidence-Based Instruction (EBI) is crucial; and part of legitimizing EBI involves advocating for its institutionalization. An institution is understood as taken-for-granted repetitive social behavior that is underpinned by normative systems and cognitive understandings that gave meaning to social exchange and thus enable self-reproducing social order (Greenwood et al. 2008). In this context then, institutional change is given by the displacement of one set of institutional arrangement by another. This process of institutional change occurs when a new set of arrangements becomes central to the mission, policies, and day-to-day activities of an organization. However, barriers for the institutionalization of EBI exist. These involve the lack of policies to reward excellence in teaching, lack of resources and infrastructure, and lastly lack of full integration into the academic core of the organization. Institutionalizing the scholarship of EBI requires a change in institutional culture, how knowledge is constructed and accepted, and in many cases the creation of an academic home for EBI activities where it may gain professional and social legitimacy. Through the latter, SECs play a crucial role

today. This poster will show how the institutional logics perspective can be used to understand and help facilitate the role that SEC members have in legitimizing EBI throughout their organizations, that is, how they gauge legitimacy, how they respond to tensions and barriers within Higher Education, which through the lens of the new institutional theory arise from competing institutional logics, and how these are negotiated within the organization. References: Greenwood, R., Oliver, C., Sahlin, K. and Suddaby, R. (2008) Handbook of Organizational Institutionalism, London: Sage. Taylor, A., Kahlke, R. (2017) Institutional Logics and Community Service-learning in Higher Education. Canadian Journal of Higher Education. Volume 47, 137 - 152

Infusing TA Preparatory Meetings with Pedagogy Training

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 31

Speakers: Caroline Wienhold, Assistant Director of Biology Teaching and Learning, University of Tennessee, Knoxville

Strands: Improving the Quality of Education

Abstract: Teaching Assistants are at the forefront of teaching at large universities, yet they rarely receive sufficient pedagogical training before their first day in the classroom. To improve the pedagogy of the TAs in our General Biology program, I have infused our weekly preparatory meetings with pedagogy training. The goal was to provide TAs with basic pedagogy training yet seamlessly integrate it to prevent TA push back from the perceived added time commitment. In this poster, I give examples of this integrated training along with tips and lessons learned on how to implement this type of infused training.

Teamwork makes the Dream Work: Systemic Transformation of Education through Evidence-Based Reforms

Time: 5:00 PM on Thursday, June 7, 2018   **Location:** Poster 32

Speakers: Ruthmae Sears, Robert Potter, and Gerry Meisels, University of South Florida

Abstract: In this presentation, we will describe a collaborative effort to promote research-based instructional practices within undergraduate science, technology, engineering and mathematics programs at a research-intensive university. Particularly, we will provide insights into our logic model, which illustrates various roles and responsibilities faculty undertook to place greater emphasis on student-focused and evidence based instructional practices at the institutional, departmental, and classroom level. Some of the strategies utilized included: supporting course re-design efforts, facilitating professional development training for faculty and teaching assistants, refining professional assessment measures to place more attention on teaching, awarding STEM scholars for instructional excellence, disseminating resources to support the implementation of effective instructional practices, and collaborating with transfer peer advisors to increase equitable opportunities for students transitioning from community college to the university. We will also highlight how we engaged in bi-weekly

interdisciplinary conversations to foster accountability, communicate ideas, and clarify the vision among the leadership team, which is comprised of a diverse representation of faculty and administrators.