2017 NOYCE SUMMIT

Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
We can’t simply hope that reason will prevail, we have to stand together and act.

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2017 Noyce Summit

Stimulating Research and Innovation for Preservice Education of
STEM Teachers in High-Need Schools

July 19-21, 2017
Hyatt Regency on Capitol Hill

Co-hosted by
American Association for the Advancement of Science (AAAS)
Education and Human Resources Program (EHR)
and
National Science Foundation (NSF) Division of Undergraduate Education (DUE)
Noyce Summit Overview

The theme of the 2017 Robert Noyce Teacher Scholarship Program Summit is *Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools*.

The *Noyce Summit* is supported by the National Science Foundation Robert Noyce Teacher Scholarship Program. The objectives of the Summit are to:

- Foster more research on STEM preservice teacher preparation for high-need schools, including research collaborations;
- Introduce teacher educators, researchers, current and former Noyce Scholars, and others to research and ideas for research in this area;
- Share and exchange ideas from a working group on stimulating research in this area, including papers and resources; and
- Share and exchange ideas about the NSF Noyce projects’ ongoing efforts to change science and mathematics teacher education programs, practices, and strategies for attracting, preparing, and supporting science and mathematics teachers and retaining them in the teaching workforce in high-need schools.

Invitees to the *Noyce Summit* include:

- NSF Noyce grantees;
- Representatives from NSF Noyce grantees partners, including school districts, educational agencies, community colleges and others;
- Current and former Noyce Scholars and Fellows;
- Science and mathematics educational researchers and evaluators; and
- Representatives from education and professional societies.

The format for the Summit includes plenary sessions, mini-plenary sessions, workshops, poster sessions, and structured networking sessions. Sessions will focus on research and innovations for attracting, preparing, supporting and retaining science and mathematics teachers in the workforce, particularly in high-need schools and districts.
National Science Foundation (NSF) Robert Noyce Teacher Scholarship Program

The Robert Noyce Teacher Scholarship Program seeks to encourage talented science, technology, engineering, and mathematics (STEM) majors and professionals to become K-12 STEM teachers. This program responds to the critical need for highly effective K-12 STEM teachers by recruiting and preparing talented undergraduate STEM majors and STEM professionals to pursue teaching careers in elementary and secondary schools, in high-need local educational agencies. The program seeks to encourage institutions of higher education to develop and sustain a culture where undergraduate STEM majors, especially those of the highest achievement and ability, are encouraged and supported when they express a desire to pursue K-12 STEM teaching careers.

The program was first authorized under the National Science Foundation Authorization Act of 2002 (P.L. 107-368). It was reauthorized in 2007 under the America COMPETES Act (P.L. 110-69) and the America COMPETES Reauthorization Act of 2010 (P.L. 111-358), and amended by the STEM Education Act of 2015 (P.L. 114-59). The Noyce program addresses the goal established by the President’s Council of Advisors on Science and Technology, “of ensuring over the next decade the recruitment, preparation, and induction support of at least 100,000 new STEM middle and high school teachers who have strong majors in STEM fields and strong content-specific pedagogical preparation, by providing vigorous support for programs designed to produce such teachers.” (PCAST, 2010).

By supporting the recruitment and preparation of strong STEM teachers who will teach in high-need local educational agencies, serving diverse student populations, the program supports the strategic objective (G1/O2) in the NSF Strategic Plan for 2014-2018: "Integrate education and research to support development of a diverse STEM workforce with cutting-edge capabilities." The Noyce Program supports the role of NSF as central to discovering, studying, and promoting pathways for STEM teacher education through research and development.

The Robert Noyce Teacher Scholarship Program consists of four tracks: Track 1 - The Robert Noyce Teacher Scholarships and Stipends Track (S&S), Track 2 - The NSF Teaching Fellowships Track (TF), Track 3 - The NSF Master Teaching Fellowships Track (MTF), and Track 4 - Noyce Research Track. In addition, funds for Capacity Building awards, which may lead to the development of full proposals in Track 1: S&S, Track 2: TF, or Track 3: MTF, are also supported. Partnerships between four-year institutions and two-year institutions, providing pathways leading to STEM teacher certification, are particularly encouraged.

More information about the Robert Noyce Teacher Scholarship Program can be located online at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5733&org=EHR&from=home.
American Association for the Advancement of Science (AAAS)

The American Association for the Advancement of Science is an international non-profit organization dedicated to advancing science around the world by serving as an educator, leader, spokesperson and professional association. In addition to organizing membership activities, AAAS publishes the journal Science, http://www.sciencemag.org/, as well as many scientific newsletters, books and reports, and spearheads programs that raise the bar of understanding for science worldwide.

AAAS was founded in 1848, and includes some 261 affiliated societies and academies of science, serving 10 million individuals. Science has the largest paid circulation of any peer-reviewed general science journal in the world, with an estimated total readership of one million. The non-profit AAAS is open to all and fulfills its mission to "advance science and serve society" through initiatives in science policy; international programs; science education; and more. For the latest research news, log onto EurekAlert!, http://www.eurekalert.org/, the premier science-news website, a service of AAAS.

Membership and Programs

Open to all, AAAS membership includes a subscription to Science. Four primary program areas fulfill the AAAS mission:

- Science and Policy
- International Activities
- Education and Human Resources
- Project 2061

AAAS Mission

AAAS seeks to "advance science, engineering, and innovation throughout the world for the benefit of all people." To fulfill this mission, the AAAS Board has set these broad goals:

- Enhance communication among scientists, engineers, and the public;
- Promote and defend the integrity of science and its use;
- Strengthen support for the science and technology enterprise;
- Provide a voice for science on societal issues;
- Promote the responsible use of science in public policy;
- Strengthen and diversify the science and technology workforce;
- Foster education in science and technology for everyone;
- Increase public engagement with science and technology; and
- Advance international cooperation in science.

Visit the AAAS website at http://www.aaas.org/.
AAAS Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools Initiative*

Several recent frameworks and standards groups, including the National Research Council (NRC) and the Conference Board of the Mathematical Sciences (CBMS), have called for a change in science, technology, engineering, and mathematics (STEM) teacher education and professional development, as well as for changes in teacher certification. As the community seeks to change STEM teacher preparation, it will need to build the research base. The 2010 NRC report *Preparing Teachers: Building Evidence for Sound Policy* indicates that there is a consensus on the knowledge and skills that STEM teachers need but more research is needed to reach a consensus on what constitutes effective STEM teacher preparation, particularly as related to preparing STEM teachers who are effective in high-need schools.

Thus, the AAAS initiative, *Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools*, seeks to provide resources, tools, and a community for:

- Current and prospective researchers who seek to expand the research base on STEM teacher preparation, especially as related to high-need schools; and the

- Teacher education programs that are pursuing evidence-based changes in STEM preservice teacher education, as related to high-need schools.

Activities will include:

- Developing a research agenda to help build effective STEM teacher preservice education and leadership development programs for high-need schools, including identifying what we know from current research and what we want to know. The community-driven process for developing the research agenda will include: (a) assembling and convening a working group of preservice educators, education researchers, staff in key professional societies, and others; (b) commissioning papers; (c) conducting a literature search and producing an annotated online bibliography; (d) surveying teacher preservice programs; (e) producing a preliminary report; (f) hosting a summit with the working group and teacher education program leaders and others; and (g) producing a final report.

- Developing a blueprint for innovation in STEM teacher preservice education and leadership development programs, particularly as related to high-need schools. The process for developing the blueprint will include: (a) assembling and convening a cross-disciplinary working group of preservice educators, education researchers, staff from key education and professional societies, and others; (b) collecting and summarizing information on existing undergraduate education core concepts and competencies related to STEM majors and non-majors, including teacher education students; (c) co-hosting six regional meetings to get input from college and university STEM faculty and students, local and state education agencies, and others; (d) developing a preliminary report; (e) hosting a summit with the working group, teacher education programs, and all key stakeholders; and (f) producing a final report and web-related tool(s).

This initiative will include grantees of the NSF Robert Noyce Teacher Scholarship Program and other STEM preservice education research grantees funded by the NSF and U.S. Department of Education. Internal and external evaluation of the project will examine changes in NSF Noyce teacher education and other programs, including changes in (a) who is doing research about teacher education and (b) innovations in STEM teacher education, including changes in curriculum, courses, student assessment, teaching approaches, teacher field experiences, teacher support and mentoring, teacher induction, teacher leadership development, changes in degree requirements, faculty development, licensure requirements, and changes in collaboration with local education agencies and two-year colleges.

* Supported by the NSF Robert Noyce Teacher Scholarship Program
AAAS NOYCE INITIATIVE ADVISORS

AAAS Noyce Initiative Advisors

Co-Chairs
William G. McCallum, University of Arizona
Suzanne Wilson, University of Connecticut, Neag School of Education

Members
Hilda Borko, Stanford University
Jose Blackorby, CAST, Inc.
Ann Cavallo, University of Texas at Arlington
Jeanne Century, University of Chicago
Scott Jackson Dantley, Dantley and Associates
Louis Gomez, University of California Los Angeles
Roneeta Guha, Learning Policy Institute
Charles Henderson, Western Michigan University
Heather C. Hill, Harvard Graduate School of Education
Okhee Lee, New York University
Felice J. Levine, American Educational Research Association
Heather Macdonald, College of William & Mary
Robert Megginson, University of Michigan
Stephen L. Pruitt, Kentucky Department of Education
Marilyn E. Strutchens, Auburn University

NSF Program Officers
Sandra Richardson, NSF
Kathleen Bergin, NSF

AAAS Lead Staff
Quincy Brown, AAAS
Yolanda S. George, AAAS
Shirley M. Malcom, AAAS
### WEDNESDAY, JULY 19, 2017

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<tr>
<td>3:30 pm - 9:00 pm</td>
<td><strong>Registration</strong></td>
<td><em>(Regency Foyer Wall)</em></td>
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<tr>
<td>3:00 pm - 6:30 pm</td>
<td><strong>Poster Setup</strong></td>
<td><em>(Regency Foyer/Columbia Foyer/ Columbia A,B)</em></td>
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<tr>
<td>3:00 pm - 5:00 pm</td>
<td><strong>Museum Tours for Scholars and Fellows: Tour Group 1</strong></td>
<td><em>(Meet Tour Guides at the Regency Foyer Wall)</em></td>
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<tr>
<td>3:00 pm - 5:00 pm</td>
<td><strong>New Awardees Session with NSF Staff</strong></td>
<td><em>(Regency A)</em></td>
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<tr>
<td>5:00 pm - 6:30 pm</td>
<td><strong>Plenary Session 1</strong></td>
<td><em>(Regency A,B,C)</em></td>
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**Moderator and Welcome:**
- William McCallum, University Distinguished Professor of Mathematics at the University of Arizona and Co-Chair, AAAS Noyce Initiative

**Welcome Remarks:**
- Sandra Richardson, Program Director and Program Lead, Robert Noyce Teacher Scholarship Program, DUE, NSF
- Shirley M. Malcom, Director, Education and Human Resources Program, AAAS

**Lessons Learned from STEM Teacher Preservice Programs**

**Speakers:**
- Talia Milgrom-Elcott, Co-Founder and Executive Director, 100Kin10
- Audra Watson and Bethany Rogers, Woodrow Wilson Foundation Teaching Fellowship Programs

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<tr>
<th>Time</th>
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<tr>
<td>6:30 pm - 8:00 pm</td>
<td><strong>Poster Session 1 and Networking Reception</strong></td>
<td><em>(Regency Foyer/Columbia Foyer/ Columbia A,B)</em></td>
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### THURSDAY, JULY 20, 2017

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<th>Event</th>
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<tr>
<td>7:00 am - 6:00 pm</td>
<td><strong>Registration</strong></td>
<td><em>(Regency Foyer Wall)</em></td>
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<tr>
<td>7:00 am - 2:00 pm</td>
<td><strong>Poster Setup</strong></td>
<td><em>(Regency Foyer/Columbia Foyer/ Columbia A,B)</em></td>
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<tr>
<td>7:00 am - 7:45 am</td>
<td><strong>Plenary Session 2 and Networking Breakfast</strong></td>
<td><em>(Regency A,B,C)</em></td>
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<td>7:45 am - 9:15 am</td>
<td><strong>Panel and Feedback Session with Selected Authors who are Preparing Commissioned Papers on Research on STEM Preservice Education</strong></td>
<td><em>(Regency A,B,C)</em></td>
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**Moderator:**
- Kathleen Bergin, Program Director, Co-Lead Robert Noyce Teacher Scholarship, NSF Program

**Panelists and Topics**
- **STEM Teacher Recruitment**
  - Dana Franz, Associate Professor, Mississippi State University, College of Education, Department of Curriculum and Instruction
  - Maria Fernandez, Associate Chair of the Department of Teaching and Learning and Associate Professor of Mathematics Education, Florida International University

**Teacher Preparation that Leads to Retention in the STEM Teaching Workforce**
- Edward J. Fuller, Associate Professor, Educational Leadership Program, and Executive Director, Center for Education Evaluation and Policy Analysis
  - Department of Education Policy Studies, College of Education, Penn State University
AGENDA

Characteristics of Clinical Experiences that Affect STEM Outcomes

Audra Watson, Director of Curriculum, Mentoring, and Assessment, Woodrow Wilson Foundation Teaching Fellowship Programs

Bethany Rogers, New Jersey State Director, Woodrow Wilson Foundation Teaching Fellowship Programs

Teacher Induction Programs that Lead to Retention in the STEM Teaching Workforce

Peter Youngs, Associate Professor, Department of Curriculum, Instruction, and Special Education, Curry School of Education, University of Virginia

Jihyun Kim, Assistant Professor, Lehigh University

Measurement and Research Design for Preservice STEM Education

Drew Gitomer, Rose and Nicholas DeMarzo Chair, Rutgers Graduate School of Education

Courtney A. Bell, Senior Research Scientist, ETS, Learning and Teaching Research Group and a Fellow in the Center for the Study of Teacher Assessment

Kayla Croteau, University of New Hampshire

Kearstie Hernandez, University of Southern California

Stephanie Sheehan, CUNY College of Staten Island

Erica Stills, Virginia State University

Genaro Villalobos, Texas A&M International University

9:30 am - 10:45 am

Concurrent Workshops Session 1

(See handout for workshop room assignments.)

10:45 am - 11:00 am

Break

11:00 am - 12:00 pm

Plenary Session 3: Voices from the Field

(Regency A,B,C)

Welcome and Moderator:

Kayla Heimann, Einstein Fellow, NSF Directorate for Education and Human Resources

Voices from the Field Panelists:

Bryant Cooper, California State University, Northridge

12:00 pm - 12:15 pm

Break

12:15 pm - 1:45 pm

Plenary Session 4 and Working Lunch

(Regency A,B,C)

Moderator:

Sandra Richardson, Program Director and Program Lead, Robert Noyce Teacher Scholarship Program, DUE, NSF

Welcome Remarks:

Rush Holt, AAAS CEO and Executive Publisher of Science Family of Journals

Speaker:

Gloria Ladson-Billings, Department of Curriculum and Instruction, Kellner Family Endowed Professorship in Urban Education, University of Wisconsin

1:45 pm - 2:00 pm

Break

2:00 pm - 3:30 pm

Poster Session 2

(Regency Foyer/Columbia Foyer/Columbia A,B)

3:30 pm - 4:00 pm

Remove Posters

Break

4:00 pm - 6:00 pm

Panel Discussion with Leaders of the AAAS Noyce Regional Dialogues on Innovation for Preservice Education of STEM Teachers in High-Need Schools

(Regency A,B,C)

Moderator:

Quincy Brown, AAAS Program Director, STEM Education Research
**AGENDA**

**Introduction of Speaker:**
Robin Wright, Division Director, Division of Undergraduate Education (DUE), NSF

**Speaker:**
Joan Ferrini-Mundy, Chief Operating Officer, NSF

**Panel Moderator and Opening Remarks:**
Quincy Brown, AAAS Program Director, STEM Education Research

**Panelists:**
- **Northeast:** Doug Larkin, Associate Professor, Department of Secondary and Special Education, Montclair State University
- **Midwest:** Sharon Vestal, Associate Professor, Coordinator, South Dakota State University
- **Southeast:** Michelle Head, Assistant Professor of Chemistry, Kennesaw State University
- **Southwest:** S. Justin Polizzi, Research Assistant Professor, Kennesaw State University
- **West:** Frederick Freking, Associate Professor of Clinical Education, University of Southern California, Rossier School of Education
  - Imelda Nava, Science Faculty Advisor, UCLA

6:00 pm

**Dinner On Your Own**

**FRIDAY, JULY 21, 2017**

7:00 am - 8:00 am

**Networking Session 2 and Continental Breakfast**
(Regency A,B,C)

8:00 am - 10:00 am

**Discussion Sessions on Innovation for Preservice Education of STEM Teachers in High-Need Schools**
(See handout for room assignments)

10:00 am - 10:15 am

**Break**

10:15 am - 11:15 am

**Concurrent Workshops Session 2**
(See handout for workshop room assignments.)

11:15 am - 11:30 am

**Break**

11:30 am - 12:30 pm

**Plenary Session 5: Closing Plenary**
(Regency A,B,C)

**Synthesis from Discussion Groups on Innovation for Preservice Education of STEM Teachers in High-Need Schools**

**Discussants:**
- William McCallum, University Distinguished Professor of Mathematics at the University of Arizona and Co-Chair, AAAS Noyce Initiative
- William “Jim” Lewis, Assistant Director (Acting), Education and Human Resources Directorate, NSF

**Closing Remarks:**
Shirley M. Malcom, Director, Education and Human Resources Programs, AAAS

Evaluation

12:30 pm

**Summit Adjourns**

12:30 pm

**Museum Tours for Scholars and Fellows: Tour Group 2**
(Meet Tour Guides at the Regency Foyer Wall)
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Courtney Bell is a Senior Research Scientist in ETS’s Understanding Teaching Quality Initiative. She completed her doctorate at Michigan State University in Curriculum, Teaching, and Educational Policy after earning her BA in Chemistry at Dartmouth College. A former high school science teacher and teacher educator, Bell’s work focuses on the measurement of teaching and how measures of teaching are understood and used in the policy and practice communities.

Her studies use mixed-methods to analyze the measurement of teaching and the validity of measures of teaching quality focusing in particular on observational assessments of teaching. Current and recent studies funded by the Institute for Educational Sciences, the National Science Foundation, and the Gates, W.T. Grant and Spencer Foundations investigate how administrators learn to use a high stakes observation protocol, how raters use subject specific and general protocols, how various measures of teaching compare, and the ways in which observation protocols capture high quality teaching for students with special needs.

As part of her work on a research and development project for initial teacher licensure, Bell is collaborating with colleagues at ETS, Mursion, and TeachingWorks (University of Michigan) to develop measures of beginning teachers’ content knowledge for teaching and ability to enact high leverage practices in ELA and mathematics. She has published in scholarly journals including Educational Assessment, Educational Evaluation and Policy Analysis, Journal for Research in Mathematics Education, American Journal of Education, Journal of Education Policy, and Teachers College Record. She co-edited the 5th Edition of AERA’s Handbook of Research on Teaching.

Kathleen Bergin is a Program Director in the Division of Undergraduate Education, Directorate for Education and Human Resources, NSF. Kathleen Bergin is a biologist by training, but an educator by passion. Bergin currently serves as the Lead Program Officer in the Robert Noyce Teacher Scholarship program and the Lead Program Officer in the Math and Science Partnerships/STEM-C: MSP Partnerships legacy program. She also serves as a Program Officer in the Improving Undergraduate STEM Education (IUSE: EHR) program, primarily related to teacher preparation and interdisciplinary studies.

Bergin manages a portfolio of awards in the programs listed above, as well as in the EHR Core Research (ECR) program, and in the Transforming Undergraduate Education in STEM (TUES) and the Laboratory Improvement (CCLI) programs, the latter two related to undergraduate biology, as well as the Innovation through Institutional Integration legacy program. She believes that all can learn mathematics and science at deep meaningful levels, and that it is the adults that need to work to discover the strategies that will engage, motivate, and provide access to the creativity and wonder that are inherent in these disciplines.

Bergin holds degrees from Georgia College at Milledgeville and Georgia State University. She was a classroom teacher of chemistry, physics, and biology for twelve years. She was a central office administrator for three years, during which time she implemented a totally hands-on middle grades mathematics and science program. She has been a State Science Coordinator, State Curriculum Director, and held positions at the University of Georgia and the Georgia Institute of Technology, where she retired as the Associate Director for the Center for Education Integrating Science, Mathematics and Computing (CEISMC) in the College of Sciences prior to returning (previously on-loan to NSF) to the National Science Foundation as a permanent employee in 2004.

It is the amalgam of these experiences that have brought Bergin to believe that it is the conceptual understandings, dispositions, and problem solving skills found in mathematics and science that serve as the basis for success for all individuals relative to personal economic sufficiency, civic responsibility, social justice, and joie de vivre. She believes that our youth should not be shackled by limiting adult perceptions of their potential, but rather adults should ensure that our youth own the mathematical and scientific knowledge and skills that will allow them to explore the post-secondary options of their choosing, in the near and long-term. It’s about preparation, opportunity, and options for all.

Quincy Brown is a Program Director for STEM Education Research at the American Association for the Advancement of Science (AAAS). Her project portfolio includes the Robert Noyce Teacher Scholarship Program and investigating innovations in preservice STEM teacher education, investigating STEM mentoring practices, and supporting the AAAS Emerging Researchers National Conference.
She was previously a Senior Policy Advisor in the White House Office of Science and Technology Policy. There her portfolio included Agricultural Entrepreneurship, STEM Education, and the My Brother’s Keeper STEM+ Entrepreneurship initiatives. She was also an AAAS Science and Technology Policy Fellow at the National Science Foundation. She earned her PhD in Computer Science from Drexel University. She is a recipient of the Computing Community Consortium (CCC) CI Fellows Postdoctoral Research Fellowship award and was a National Science Foundation GK-12 and Bridge To the Doctorate Fellow.

Brown was also a Professor of Computer Science at Bowie State University. Her research interests included Mobile HCI, CS Education, and Broadening Participation in Computing. In 2011 she founded Girls Who Will, a summer program for middle and high school girls. Through her research she sought to identify methods of facilitating human interaction with advanced technologies to support learning. Her projects included exploring the ways in which young children use touch and gesture interactions with mobile devices, first responders’ use of mobile devices during emergency evacuations, and modeling inquiry behaviors on mobile devices.

Ann Cavallo, Associate Dean for Research and Co-Director, UTeach Arlington; Distinguished Professor of Science Education, University of Texas, Arlington

Ann Cavallo is Associate Dean for Research and Graduate Studies, Co-director of UTeach Arlington, and Distinguished University Professor of Science Education in the College of Education at the University of Texas at Arlington (UTA). She earned her BS from Niagara University, and her MS in Science Education/Biology, MS in General Science, and PhD in Science Education from Syracuse University. She holds secondary teacher certification in Biology, Chemistry, Earth Science, and General Science, and taught middle and high school science prior to earning her graduate degrees.

Cavallo has held faculty appointments at the University of Oklahoma, the University of California-Davis, and Wayne State University. In 2015 she received the Distinguished Record of Research Award and in 2016 was named Distinguished University Professor and inducted into the Academy of Distinguished Scholars at UTA. She is currently Principal Investigator of two National Science Foundation Robert Noyce grants totaling over $2 million. She investigates high school and college students’ learning approaches and strategies, scientific reasoning, self-efficacy, and their acquisition of conceptual understandings of science, particularly through inquiry-based teaching models. She also studies teacher learning, induction, and retention in the profession.

Cavallo has over 40 publications in internationally and nationally refereed journals and proceedings, as well as several books and book chapters. In total, she has secured more than $9 million in grants from various funding agencies to support her work. She has made over 70 presentations at professional conferences, and has held significant leadership positions in professional organizations.

Maria Fernandez, Associate Chair, Department of Teaching and Learning and Associate Professor of Mathematics Education, Florida International University

Maria L. Fernandez joined the faculty of Florida International University (FIU) in Fall 2007. Originally from Miami, she received a BS and MS from FIU and was a Miami-Dade Public School mathematics teacher for several years. Later, she attended and graduated from the University of Georgia with a PhD in Mathematics Education (and completed 32 credits of graduate mathematics including doctoral level). She then worked at the University of Arizona and Florida State University.

Her research and scholarly work is primarily within the areas of creating and investigating approaches for the professional development of prospective and practicing teachers of mathematics working with diverse learners, and developing and exploring approaches for improving the mathematics teaching and learning of diverse learners. Her work has been published in a variety of well-established peer-reviewed journals and research proceedings. As of Spring 2011, she has been awarded over $2.5 million in external funding.

As an active member of professional organizations, she has been elected and served in various leadership roles including Chair of the Psychology of Mathematics Education-North American Chapter in 2000, and most recently serving on the 2009-2010 Program Committee for the Association of Mathematics Teacher Educators, and as 2010-2012, Secretary of the Florida Association of Mathematics Teacher Educators. As a faculty member, she serves on, chairs or co-chairs multiple doctoral committees and has collaborated with her doctoral students in the conduct and dissemination of research.

Since joining FIU, she has worked extensively with faculty in the college, as well as across the university, garnering external funding for projects such as Florida Promise, engaging in curriculum development including taking the lead on the development of the College of Education components of the BA in Mathematics: Mathematics Education Track, and collaborating
Joan Ferrini-Mundy, Chief Operating Officer, NSF

Joan Ferrini-Mundy is Chief Operating Officer for the National Science Foundation. Previously, she was Assistant Director of the National Science Foundation (NSF) for Education and Human Resources, a position she held from February 2011. As AD/EHR she was responsible for the leadership of the NSF Directorate for Education and Human Resources (EHR). She has served the Foundation in a number of capacities since 2007 including as inaugural director (through an Intergovernmental Personnel Act appointment) of the EHR Directorate’s Division of Research on Learning in Formal and Informal Settings.

From 2007 through 2009, Ferrini-Mundy was a member of the National Science and Technology Council’s (NSTC) Subcommittee on Education, and currently co-chairs the Strategic Plan workgroup of the National Science and Technology Council Committee on STEM Education. She is a member of the Mathematics Expert Group of the Programme for International Student Assessment (PISA), and in 2007-2008, representing NSF, she served as an ex officio member of the President’s National Mathematics Advisory Panel, and co-chaired its Instructional Practices Task Group.

From 1999 - 2011, Ferrini-Mundy held an appointment at Michigan State University (MSU), where she was a University Distinguished Professor of Mathematics Education in the Departments of Mathematics and Teacher Education, and Associate Dean for Science and Mathematics Education in the College of Natural Science. Her research interests include calculus teaching and learning, mathematics teacher learning, and mathematics and science education policy at the K-12 level. Ferrini-Mundy holds a PhD in mathematics education from the University of New Hampshire. She was elected a fellow of the American Association for the Advancement of Science in 2011.

Dana Franz, Associate Professor, Department of Curriculum and Instruction and Special Education, Mississippi State University, College of Education

Dana Pomykal Franz is an Associate Professor in the Department of Curriculum, Instruction and Special Education at Mississippi State University. Franz works with both undergraduate mathematics education and secondary graduate education. Additionally, she engages in professional development for middle and secondary mathematics teachers. Franz is the lead MS partner in APLU’s Mathematics Teacher Education Partnership. This work has provided her with opportunities to work at a national level focusing on recruitment and retention of mathematics and science teachers.

She earned her PhD in Educational Psychology from Texas A&M University, an MA in School Administration, and a BS in Mathematics Education and Special Education from Trinity College in San Antonio, Texas.

Frederick Freking, Associate Professor of Clinical Education, University of Southern California (USC), Rossier School of Education

Frederick W. Freking is an Associate Professor of Clinical Education at the USC Rossier School of Education. Freking began his career in Science Education as a Biology Major at the University of California, Santa Barbara. He earned his teaching credential at Azusa Pacific University and taught Biology and Human Anatomy and Physiology at Covina High School.

His desire to learn science at a deeper level led him to the Physiological Science Department at the University of California, Los Angeles. He completed his thesis on “The Synthesis and Metabolism of Androgen in a Songbird: A Study of the Tissue Expression of the Sex Steroid Synthetic and Metabolic Enzymes” to earn his PhD in the field of neuroscience. Freking then accepted a faculty position in the UCLA Science Teacher Education Program where he was able to combine his science teaching and science research experience to prepare future science teachers and teach undergraduate science courses.

Since joining the Rossier School of Education in 2010, Freking has prepared hundreds of STEM teachers in the USC MAT Program. He has also led doctoral students in the study of K-12 STEM Integration and STEM Teacher Education. Freking is a Co-PI on STEM projects funded by Mattel, Toyota and 100Kin10 and recently has worked with the California Commission on Teacher Credentialing to create a new Teacher Performance Assessment.
Edward J. Fuller, Associate Professor, Educational Leadership Program, and Executive Director, Center for Education Evaluation and Policy Analysis, Department of Education Policy Studies, College of Education, Penn State University

Edward Fuller is an associate professor in the Department of Education Policy Studies in the College of Education at the Pennsylvania State University. His research interests include: educator (teacher, principal, and central office administrator) quality, distribution, mobility, turnover, and career pathways; educator preparation; school improvement; evaluation; and, charter schools. Prior to joining the Penn State faculty, he was a special research associate and adjunct faculty at the University of Texas at Austin. He has also served as the Director for Research at the Texas State Board for Educator Certification and Program Director for Evaluation at the Charles A. Dana Center at the University of Texas at Austin.

He received three degrees from the University of Texas at Austin: Bachelor of Science in Education, Master’s Degree in Educational Administration (Principalship Program), and a PhD in Educational Administration (Policy and Planning). He was a secondary mathematics teacher in a rural district and urban district before returning for his master’s degree.

Fuller also serves as the Director of the Penn State Center for Evaluation and Education Policy Analysis (PCEEPA) and as Associate Director of Policy for the University Council for Educational Administration (USEA). PSEEPA provides evaluation assistance to schools, school districts, and organizations in the Commonwealth and across the nation. The Center also focuses on providing analyses of education policies in the Commonwealth and across the nation. As UCEA Associate Director of Policy, Fuller works with the UCEA President and Executive Committee to review policy proposals, develop policy agendas, develop coalitions with other groups, educate state and policymakers, and engage UCEA members in the policy process. This position builds on his wealth of experience in working with the Texas Legislature from 1997 through 2011.

Yolanda S. George, Deputy Director, Education and Human Resources (EHR) Programs, AAAS

Yolanda Scott George is Deputy Director and Program Director, Education and Human Resources Programs, American Association for the Advancement of Science (AAAS). She has served as Director of Development, Association of Science-Technology Centers (ASTC), Washington, DC; Director, Professional Development Program, University of California, Berkeley; and as a research biologist at Lawrence Livermore Laboratory, Livermore, California involved in cancer research and cell cycle studies using flow cytometer and cell sorters.

George conducts evaluations, workshops and reviews for the National Institutes of Health and National Science Foundation (NSF), as well as for private foundation and public agencies, including the European Commission. She develops and coordinates conferences and workshops related to STEM undergraduate reform and recruitment and retention of minorities, women, and persons with disabilities in STEM. She works with UNIFEM, UNESCO, L’Oreal USA and Paris, and non-governmental organizations on gender, science, and technology initiatives related to college and university recruitment and retention and women leadership in STEM. She currently serves as principal investigator (PI) or co-PI on several NSF grants, including Vision and Change in Undergraduate Biology Education; National Science Education Digital Library (NSDL) Biological Sciences Pathways; Historically Black Colleges and Universities-Undergraduate Programs (HBCU-UP); Robert Noyce Teacher Scholarship Program; Transforming Undergraduate Education in STEM (TUES) and Virtual Faculty Workshop; and Women’s International Research Collaborations at Minority Serving Institutions. In addition, George is the lead AAAS staff person for the L’Oreal USA Fellowships for Women in Science Program (postdoctoral fellowships) and the David and Lucile Packard Foundation HBCU Graduate Scholars Program (graduate school fellowships).

George serves on a number of boards or committees, including: Maria Mitchell Women in Science Awards Committee; McNeil/Lehrer Productions Online Science Reports Advisory Committee; Burroughs Welcome Fund, Science Enrichment Program Grants, Advisory Board; The HistoryMakers, ScienceMakers, Advisory Board; and the National Advisory Board of The American Physical Society Physics Bridge Program. She has authored or coauthored over 50 papers, pamphlets, and hands-on science manuals. She received her BS and MS from Xavier University of Louisiana and Atlanta University in Georgia, respectively.

Drew Gitomer, Rose and Nicholas DeMarzo Chair, Rutgers Graduate School of Education

Drew Gitomer joined the Rutgers University Graduate School of Education as the Rose and Nicholas DeMarzo Chair in Education in September 2011. As a member of the Learning and Teaching Department, his research centers on the assessment and evaluation of teaching and related policy issues in teaching and teacher education. His current work focuses on a range of
constructs that are related to teaching quality, including the quality of classroom interactions, teacher knowledge, teacher beliefs, and student achievement.

He and his colleagues are carrying out validity studies of a variety of measures, including classroom observation protocols, classroom assignment protocols, and new measures of teacher knowledge. Through this work, Gitomer and his colleagues always strive to make progress on understanding the contextual factors that influence the quality of teaching that is observed.

Prior to coming to Rutgers, Gitomer was a researcher and Senior Vice-President of Research at Educational Testing Service in Princeton, NJ, where he most recently led the Understanding Teaching Quality Center. In addition to the examination of the academic profile of individuals entering teaching, Gitomer’s previous work includes research on and development of assessments for the National Board for Professional Teaching Standards. He also conducted research on assessments for students, all from the perspective of developing assessment methods that are directly related to instruction and learning.

He served as co-editor of the AERA Handbook of Research on Teaching (5th ed.) that was released in 2016 and was co-editor of Educational Evaluation and Policy Analysis from 2006–2009.

Greg Hale, Assistant Dean of Science and Co-Director, UTeach Arlington, University of Texas, Arlington

Greg Hale is the Director of the Science Education and Career Center, a Co-Director of UTeach Arlington, and Assistant Dean of Students and Science Education in the College of Science at the University of Texas at Arlington. He has worked with in-service and pre-service science teachers since 2001. His work with in-service teachers has largely centered on his role as an instructor and program director for the College of Science’s Master of Arts in Interdisciplinary Science. He has been involved as an instructor and administrator of science courses for middle level and elementary pre-service teachers since 2002, and his involvement with pre-service secondary science and math teachers began when he was named a Co-Director of UTeach Arlington in 2009.

In addition to his work with pre-service and in-service teachers, he also has outreach projects that aim to increase the size, quality, and diversity of the STEM professional pipeline out of K-12 schools. Since being named Assistant Dean of Science in 2006, he has been the Principal Investigator for projects that have brought in over $4.8M and a Co-Principal Investigator on projects that have brought in an additional $4.9M.

Hale received his PhD in Organic Chemistry from the University of Pittsburgh and his BS in Chemistry from Rochester Institute of Technology.

Michelle Head, Assistant Professor of Chemistry, Kennesaw State University

Michelle Head has long been interested in pursuing a career in science education. Unlike many students, she knew that she wanted to become a science teacher upon high school graduation. She enrolled at SUNY Cortland and received a BS in Adolescent Education-Biology in 2001, where she also majored in Chemistry. While there she discovered discipline-based education research, a field that bridged her interests-research and education. As the lone chemist in a teaching methods course, she felt that there was a lot to be investigated with regards to chemistry teacher preparation. Michelle earned a PhD in Chemistry in 2011 from the University of Connecticut. Although her dissertation focused on the use of models in organic chemistry, the impact of the teacher preparation program lingered.

Head is an Assistant Professor at Kennesaw State University. She is a PI on Pipeline to Teacher Preparation in Chemistry and Physics (DUE-1340019), which focuses on the recruitment of undergraduate students as early as their high school years. In addition, she serves as a Co-PI on Recruiting and Retaining Teacher Leaders in Physics and Chemistry (DUE-1035451) where teacher leadership underpins the activities that the teaching fellows engage in during their teacher preparation and induction years. Through her involvement in these programs, she has developed a research agenda that investigates the perception that undergraduate STEM students have regarding a career in science education, as well as investigating the development of teacher leadership during the early years of teaching.

Kayla Heimann, Einstein Fellow, NSF Directorate for Education and Human Resources

Kayla Heimann is a 2016-2017 Albert Einstein Distinguished Educator Fellow serving at the National Science Foundation (NSF) Directorate for Education and Human Resources (EHR) in the Office of the Assistant Director (OAD) and in the Division of Undergraduate Education (DUE). Kayla comes to her fellowship appointment as a fifth grade math and science teacher from Eastern Elementary School within Lexington Local School District in Lexington, OH.
Kayla is a certified teacher for middle grades 4-9 in math and science and holds principal licenses for all K-12. During her time with Lexington schools, Kayla served as a new teacher mentor, coached junior high volleyball and swimming, and served as a coach for the varsity swim program. Kayla also serves on the Mathematics Alignment Study Committee for the Ohio Department of Education.

Kayla earned a Bachelor of Science in Middle Grades Education and a Master of Education in Education Leadership and Administration, both from Ashland University, in Ashland, OH. Dedicated to lifelong learning and professional development, Kayla is constantly seeking opportunities to broaden her knowledge. She was on a team of teachers from her district in NASA’s Teaching from Space program, one of seven teams selected nationwide. The program included a week in Houston, TX, where she conducted a classroom experiment on NASA’s microgravity plane. In addition to her time with NASA, Kayla was a DOW fellow with NSTA’s New Science Teacher Academy, a member of the Ohio Energy Project’s Energy Sources Tour, chosen for the WWII Real World Science Academy Cohort, selected to attend the DIG Field School and was one of 12 Ohio educators chosen for the Mickelson ExxonMobil STEM Teachers Academy.

Jihyun Kim joins the Educational Leadership program at Lehigh University as an assistant professor in August. Jihyun Kim received her PhD degree in educational policy from Michigan State University. Before joining the program, she worked as a regular homeroom teacher for 5th and 6th grade students in an elementary school in Korea.

Kim received her bachelor’s degree in Elementary Education and master’s degree in Elementary School Administration from Seoul National University of Education in Korea. Her research interests include teaching quality, teachers’ social networks, policy implementation, and principals’ leadership.

Jihyun Kim, Assistant Professor, Lehigh University

Gloria Ladson-Billings, Department of Curriculum and Instruction, Kelner Family Endowed Professorship in Urban Education, University of Wisconsin

Gloria Ladson-Billings, a leading pedagogical theorist and teacher educator, becomes the next President of the National Academy of Education (NAEd), Fall 2017.

Known for her groundbreaking work in the fields of Culturally Relevant Pedagogy and Critical Race Theory, Ladson-Billings will succeed Michael Feuer in a four-year term. The Academy’s President is elected by its membership, who are themselves elected on the basis of outstanding scholarship or contributions to education.

Ladson-Billings is the Kelner Family Distinguished Professor of Urban Education in the Department of Curriculum and Instruction and faculty affiliate in the Department of Educational Policy Studies at the University of Wisconsin, Madison. She was the 2005-2006 president of the American Educational Research Association. Her research examines the pedagogical practices of teachers who are successful with African-American students. She also investigates Critical Race Theory applications to education.

She is the author of the critically acclaimed books The Dreamkeepers: Successful Teachers of African American Children and Crossing Over to Canaan: The Journey of New Teachers in Diverse Classrooms, and numerous journal articles and book chapters. She is the former editor of the American Educational Research Journal and a member of several editorial boards. Her work has won numerous scholarly awards including the H.I. Romnes Faculty Fellowship, the NAEd/Spencer Postdoctoral Fellowship, and the American Educational Research Journal's Distinguished Scholar Award.

Gloria Ladson-Billings

Rush D. Holt, PhD, became chief executive officer of the American Association for the Advancement of Science (AAAS) and executive publisher of the Science family of journals in February 2015. In this role, Holt leads the world’s largest multi-disciplinary scientific and engineering membership society. Holt has held positions as a teacher, scientist, administrator, and policymaker. He also served as an arms control expert at the U.S. State Department, where he monitored the nuclear programs of countries such as Iraq, Iran, North Korea, and the former Soviet Union.

Before coming to AAAS, Holt served for 16 years as a member of the U.S. House of Representatives, representing New Jersey’s 12th Congressional District. From December 2014 to February 2015, Holt was appointed a Director’s Visiting Scholar at the Institute for Advanced Study in Princeton, New Jersey. Holt is a Phi Beta Kappa graduate of Carleton College in Northfield, Minnesota, and earned MA and PhD degrees in physics from New York University. He is an elected fellow of AAAS and the American Physical Society, and is a member of Sigma Xi, and he holds honorary degrees from Monmouth University, Rider University, Thomas Edison State College, and the University of Toledo.

Rush D. Holt, AAAS CEO and Executive Publisher of Science Family of Journals
During the 2003-2004 academic year, she was a fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford University. In fall of 2004, she received the George and Louise Spindler Award from the Council on Anthropology and Education for significant and ongoing contributions to the field of educational anthropology. She holds honorary degrees from Umeå University (Umeå Sweden), University of Massachusetts-Lowell, and the University of Alicante (Alicante, Spain).

Doug Larkin, Associate Professor, Department of Secondary and Special Education, Montclair State University

Douglas B. Larkin is an Associate Professor in the Department of Secondary and Special Education at Montclair State University (MSU) in New Jersey. He worked as a high school physics and chemistry teacher for ten years—most recently in Trenton, NJ—and also served as a Peace Corps Volunteer teaching physics and mathematics in Kenya and Papua, New Guinea. He received his PhD in Teacher Education in 2010 from the University of Wisconsin-Madison.

His main research concerns the preparation of science teachers for culturally diverse classrooms. At Montclair, Larkin works with preservice secondary science and mathematics teachers in the Noyce Teacher Scholarship program, the Woodrow Wilson Teaching Fellowship Program, the Newark-Montclair Urban Teacher Residency program, and with doctoral students in Montclair’s Teacher Education and Teacher Development program. He is the co-PI on the MSU Noyce Teacher Scholarship Program, a $1.4M grant funded by the National Science Foundation, and PI on the AAAS/NSF Noyce Northeast Regional Dialogue conference grant.

Larkin currently serves as section editor for the journal Science Education. His book, Deep Knowledge: Learning to Teach Science for Understanding and Equity, was published by Teachers College Press in 2013. His most recent article, “Reasoning About Race and Pedagogy in Two Preservice Science Teachers: A Critical Race Theory Analysis” was published in Cognition and Instruction in fall 2016. He was recently awarded the Libra Visiting Professorship at the University of Maine for the fall of 2017.

William “Jim” Lewis, Assistant Director (Acting), Education and Human Resources Directorate, NSF

W. James "Jim" Lewis is the Assistant Director (Acting) for the Education and Human Resources Directorate at the National Science Foundation. Lewis is on leave from the University of Nebraska-Lincoln (UNL), where he is the Aaron Douglas professor of mathematics and Director of the Center for Science, Mathematics, and Computer Education. While at NSF, Lewis has served as co-chair of the P-12 Education Interagency Working Group, tasked with coordinating efforts to improve P-12 STEM instruction through efforts across federal agencies. Lewis began his current position in January 2015.

At UNL, he served as chair of the Department of Mathematics (1988-2003), during which time the department won the University-wide Department Teaching Award and an NSF Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. He also was the Principal Investigator for three major NSF grants, the Math in the Middle Institute Partnership (2004-2011), NebraskaMATH (2009-2014) and NebraskaNOYCE (2010-2014).

Lewis has received many teaching awards including his university's Outstanding Teaching and Instructional Creativity Award and the Carnegie Foundation’s 2010 Nebraska Professor of the Year Award. He is also the recipient of the UNL Chancellor's Commission on the Status of Women Award for his support of opportunities for women in the mathematical sciences and UNL’s Louise Pound-George Howard Distinguished Career Award. In 2015, Lewis was recognized by the Mathematical Association of America's Gung and Hu Award for Distinguished Service and the American Mathematical Society's Award for Impact on the Teaching and Learning of Mathematics. He received his PhD in mathematics from Louisiana State University in 1971.

Shirley M. Malcom, Director of Education and Human Resources (EHR) Programs, AAAS

Shirley M. Malcom, Director of Education and Human Resources (EHR) Programs at AAAS, has served as a program officer in the NSF Science Education Directorate; an assistant professor of biology, University of North Carolina, Wilmington; and a high school science teacher. Malcom received her PhD in Ecology from the Pennsylvania State University; Master’s in Zoology from the University of California, Los Angeles; and Bachelor’s with distinction in
Zoology from the University of Washington. In addition, she holds 17 honorary degrees.

Malcom serves on several boards, including the Heinz Endowments, Public Agenda, Digital Promise, and the National Mathematics and Science Initiative. She serves as a trustee of Caltech and as a Regent of Morgan State University. In 2003, Malcom received the Public Welfare Medal of the National Academy of Sciences, the highest award given by the Academy. She was a member of the National Science Board, the policymaking body of NSF, from 1994 to 1998, and of the President’s Committee of Advisors on Science and Technology from 1994 to 2001.

William McCallum, University Distinguished Professor of Mathematics at the University of Arizona and Co-Chair, AAAS Noyce Initiative

William G. McCallum is a University Distinguished Professor of Mathematics at the University of Arizona. Born in Sydney, Australia in 1956, he received his PhD in Mathematics from Harvard University in 1984, under the supervision of Barry Mazur. After spending two years at the University of California, Berkeley, and one at the Mathematical Sciences Research Institute in Berkeley, he joined the faculty at the University of Arizona in 1987.

In 1989, he joined the Harvard Calculus Consortium, and is the lead author of the Consortium’s multivariable calculus and college algebra texts. In 1993–94 he spent a year at the Institut des Hautes Etudes Scientifiques, and in 1995–96 he spent a year at the Institute for Advanced Study on a Centennial Fellowship from the American Mathematical Society.

In 2005, he received the Director’s Award for Distinguished Teaching Scholars from the National Science Foundation. In 2006, he founded the Institute for Mathematics and Education at the University of Arizona, and is currently its director. In 2009–2010, he was one of the lead writers for the Common Core State Standards in Mathematics. His professional interests include arithmetical algebraic geometry and mathematics education. He has received grants and written articles, essays, and books in both areas.

Talia Milgrom-Elcott, Co-Founder and Executive Director, 100Kin10

Talia Milgrom-Elcott, the Co-Founder and Executive Director of 100Kin10, is widely recognized for her visionary and innovative approach to tackling large, systemic challenges. At 100Kin10, she’s creating a new model for networked, nimble, and iterative collaboration that’s relentlessly focused on identifying—and solving—some of our most intractable social challenges. Under her leadership, what began as a call in President Obama’s 2011 State of the Union address for 100,000 excellent STEM teachers in 10 years is becoming a reality, with more than 250 leading organizations from across sectors coming together in an unprecedented movement to train and retain 100,000 excellent STEM teachers by 2021. With 100Kin10, Milgrom-Elcott is building a new type of collective-impact effort that breaks the mold for how organizations collaborate, learn from one another, and together tackle challenges that none could successfully address on its own.

Milgrom-Elcott is a frequent public speaker and moderator, focusing on social innovation, science and technology, education, philanthropy, and the tenuous balancing act that is running a start-up, being a mother and trying to have a life. Over the past several years, she’s led sessions or been a featured speaker at the White House, the Philanthropy Roundtable, CA Technologies, Scientific American, US News STEM Solutions, the National Institutes of Health, CECP, Grantmakers for Effective Organizations, the Yale School of Management, and the Social Impact Exchange’s Conference on Scaling Impact, among others. Widely known for her thought leadership, she has been published or profiled in The Washington Post, The Boston Globe, the Smithsonian, CNN Money, US News and World Report, GOOD, and Sirius’s “Leadership in Action” series.

Her work was called out as “the most important effort” in STEM teacher preparation by The New York Times in 2013; was celebrated on-stage by President Clinton as his favorite commitment to come out of CGI America and was applauded by President Obama in a personalized video address to the 100Kin10 network in 2014; and, in 2015, she was called a “leading STEM communicator” by the White House.

Milgrom-Elcott earned her chops in education and philanthropy working with amazing mentors as a Program Officer and the Senior Manager of STEM Teacher Initiatives at Carnegie Corporation of New York from 2007-13, and as part of Chancellor Joel Klein’s leadership team at the New York City Department of Education before that. Before she decided not to practice law (at least for now), Milgrom-Elcott clerked for Judge Robert Sack of the Second Circuit Federal Court of Appeals and was the first Workers’ Rights Legal Fellow at New York Jobs with Justice. In law school, Milgrom-Elcott spent an absurd amount of...
time at the Berkman Center for Internet & Society and wrote about the role of public/private spaces and institutions.

Milgrom-Elcott graduated magna cum laude from Harvard College and Harvard Law School. She’s a proud member of TheLi.st and serves as an advisor and on the boards of several great initiatives. She lives in Brooklyn with her husband and three little kids. She used to read lots of books and magazines, run, practice yoga, and sit in cafes reading the Sunday Times. Now she plays with Legos, magnetiles, and “stuffies” and reads books with pictures, a great tradeoff, all things considered.

Imelda Nava, Science Faculty Advisor, UCLA

Imelda L. Nava, PhD, has a strong dedication to urban education. She was a student, teacher and parent in Los Angeles’ urban public schools. As a science educator in UCLA’s Teacher Education Program, she works with pre-service and first year teachers as they obtain their teaching credential and Masters of Education Degree. She has guided teachers through science pedagogy, action research, and teacher identity. In her science education research, she is particularly interested in science teachers’ social justice dispositions and science discourse in the classroom. Currently, as a part of the Urban Teacher Residency Program at UCLA (IMPACT), Nava is exploring science teacher development and effectiveness using multiple measures, a framework for effective teaching and a conceptualization of STEAM. She has presented her research in a variety of national and international education conferences including the American Educational Research Association. She has been working with education leaders from China and Chile, in an effort to exchange best educational practices, leadership development, student engagement strategies, and cultural understanding.

S. Justin Polizzi, Research Assistant Professor, Kennesaw State University

S. Justin Polizzi earned his PhD in Biochemistry and Molecular Biology from the University of Georgia in 2012, and completed his postdoctoral training in Chemistry Education at Kennesaw State University (KSU). His research interests focus on structure-function relationships either at the molecular (i.e., protein biochemistry) or organizational (i.e., social network) levels. Related to this meeting, Justin served as the project manager for a TF/MTF Noyce program designed around chemistry and physics teacher leadership from 2013-2017. In that position, he facilitated and studied pre-/in-service teacher PD in biochemistry, organizational behavior, and teacher leadership. This work led to publications in teacher best practices, workforce demographics, and leadership development. As a Research Assistant Professor at KSU, he co-authored a Noyce Research Track collaborative grant funded in 2017 to study the social network principles behind teacher communities of practice and retention in the profession. He also recently served as a co-organizer for the Southeastern Regional Noyce Dialogue and helped advance the conversation about teacher leadership in teacher preparation.

Sandra Richardson, Program Director and Program Lead, Robert Noyce Teacher Scholarship Program, DUE, NSF

Sandra Richardson is a Program Director at the National Science Foundation (NSF) in the Division of Undergraduate Education, Directorate for Education and Human Resources and the Program Lead for the NSF Robert Noyce Teacher Scholarship Program. She earned a MS and PhD in Mathematics Education from Purdue University and a BS in Mathematics from Dillard University. Her research publications and scholarly interests have been motivated by the intersection of her personal, professional, and scholarly experiences as a student, teacher, research professor, and academic. Her scholarly and research interests include developing effective tools for mathematics curricula, advancing pedagogical content knowledge of mathematics teachers, studying minority and underrepresented students’ mathematical thinking at all levels of school mathematics, and mathematics teacher education. She has been the principal investigator and co-principal investigator on numerous public, private, and federal grants, including funding efforts to study secondary mathematics teachers’ mathematical knowledge for teaching, impacts of mathematics enrichment programs on students’ STEM success, and effective means of preparing prospective and in-service mathematics teachers to teach English Language Learners. In addition to Richardson’s research interests, she also has a passion for inspiring underrepresented students to pursue advanced degrees in STEM disciplines.

Richardson has served on numerous district, state, and national committees and advisory boards focusing on mathematics teacher education and increasing the representation of underrepresented students in STEM fields. She is a Mathematical Association of America Project NExT Fellow and an active member of Association of Mathematics Teacher Educators and Mathematical Association of America, among other professional societies. She has received numerous honors and awards, including a University Excellence in Teaching and Research Merit Award and the Texas State Teachers Association Advisor of the Year Award for her mentoring and outreach.
efforts and spent a summer preparing mathematics teachers in Cape Coast, Ghana.

In addition to managing a portfolio of awards in the Noyce program, Richardson also manages a portfolio of awards in the Improving Undergraduate STEM Education (IUSE), Transforming Undergraduate Education in STEM (TUES), and Laboratory Improvement (CCLI) programs.

Celeste Rohlfing, Chief Operating Officer, AAAS

Before joining AAAS in 2015, Rohlfing served as the Deputy Assistant Director for the Directorate of Mathematical and Physical Sciences (MPS) at the National Science Foundation (NSF). She was the senior career official managing the MPS Directorate with a budget of $1.4B and over 170 staff. Rohlfing joined NSF in 1997 as a Program Director in the Chemistry Division, and later served as Head of the Office of Multidisciplinary Activities, acting Division Director for the Division of Chemistry, and for the Division of Materials Research. In 2010-11, she also served as Assistant Director of Physical Sciences at the White House Office of Science and Technology Policy. From 1986 to 1997, Rohlfing was a Principal Member of Technical Staff at Sandia National Laboratories in California with over 70 scientific publications. Prior to joining Sandia, she was a Director’s-Funded Postdoctoral Fellow at Los Alamos National Laboratory. Her bachelor’s and doctoral degrees in chemistry are from Duke University (summa cum laude and Phi Beta Kappa) and Princeton University, respectively. Rohlfing is a Fellow of AAAS, and the recipient of multiple NSF awards in management excellence, equal opportunity achievement, and collaborative integration. With respect to diversity, inclusion, and broadening participation, Rohlfing has initiated numerous efforts over her career at AAAS, NSF, and Sandia National Laboratories. Most recently, she organized a AAAS-hosted Forum on Implicit Bias in Peer Review, with 80 participants from scholarly publishing and federal funding agencies to discuss approaches to mitigating implicit bias effects.

Sharon Vestal, Associate Professor, South Dakota State University

Sharon Vestal is an Associate Professor at South Dakota State University, and the PI of a Phase II Noyce grant to continue funding the Rural Enhancement of Mathematics And Science Teachers (REMAST) program and to study the effectiveness of the program, going back to the Phase I grant. She is one of two mathematics faculty who teach the mathematics methods courses for pre-service teachers at South Dakota State University. Her research is focused on teacher retention and teacher professional development. Vestal coordinates the South Dakota MTE-Partnership Team and is actively participating in the STRIDES Research Action Cluster of the MTE-Partnership.

Audra Watson, Director of Curriculum, Mentoring, and Assessment, Woodrow Wilson Foundation Teaching Fellowship Programs

Audra M. Watson, Director of Curriculum, Mentoring, and Assessment, has lead responsibility for the mentoring components of the Woodrow Wilson Foundation’s various Fellowships. Watson earned her PhD in education policy at the Graduate Center of the City University of New York. Prior to coming to the foundation in 2010, she worked with the New York City Department of Education, directing mentoring and teacher development programs.

Robin Wright, Division Director, Division of Undergraduate Education (DUE), NSF

Robin Wright is the Division Director for the Division of Undergraduate Education, Education and Human Resources Directorate, at the National Science Foundation. She was previously the Head of the Department of Biology Teaching and Learning, Senior Associate Dean for Undergraduate Initiatives in the College of Biological Sciences (CBS), Associate Dean for Faculty and Academic Affairs in the College of Biological Sciences (CBS), and professor of Genetics, Cell Biology, and Development at the University of Minnesota.

Her research program has focused on the genetics and physiology of sterol biosynthesis and cold adaptation in yeast. Over the past 21 years, she has mentored more than 100 undergraduate researchers. In recent years her work focused exclusively on undergraduate education research and initiatives. Wright has experience teaching both large and small classes, including freshman seminars, large introductory biology courses, and skill-oriented courses for honors students.

The University of Washington, her previous institution, recognized her teaching innovations with a university-wide Distinguished Teaching Award. Her major goal as Associate Dean was to catalyze the development of the nation’s best biology
curriculum, including biology courses that apply principles of active learning, research, and engagement. She helped to develop and co-teaches in an orientation/enrichment course required for all 500 incoming freshmen in the college. She has also been a leader in development of Foundations of Biology, an innovative, team-based introductory biology course for biological sciences majors.

Wright has served on the Education Committee of the American Society for Cell Biology and was formerly the chair of the Education Committee for the Genetics Society of America. In addition, she served as an editor and senior editor of the Journal: Life Science Education. She is a member of the Advisory Committee for the HHMI/National Academies of Science-sponsored Summer Institute on Biology Education, and has served as a mentor and presenter at each annual workshop since the first one in 2003. She is currently the founding editor-in-chief of the biology education journal, CourseSource, which publishes biology curriculum materials that are linked to learning outcomes established by biological sciences professional societies. In 2012, she was named a Fellow of the American Association for the Advancement of Science. In 2014, she was awarded the Elizabeth W. Jones Award for Excellence in Education from the Genetics Society of America. In 2015, she was awarded the John S. Anderson Leadership Award from the College of Biological Sciences at the University of Minnesota.

He earned a PhD and MA in Education Policy Studies from the University of Wisconsin, Madison and a BA from Brown University in Education Studies.

Lee Zia, Deputy Division Director, Division of Undergraduate Education, NSF

Lee Zia is the Deputy Division Director for DUE. He served as the Lead Program Director for the NSF National Science, Mathematics, Engineering, and Technology Education Digital Library (NSDL) Program from its inception in FY 2000 to its sunsetting in FY 2010. He served as a "rotator" in the NSF Division of Undergraduate Education during calendar years 1995 and 1996 while on leave from the Department of Mathematics at the University of New Hampshire. Zia rejoined the NSF as a permanent staff member in the fall of 1999. From November 2008 to December 2009, he served as a Commerce Science and Technology Fellow in the Office of Senator John D. Rockefeller IV. Most recently he served as the Lead Program Director for the STEM Talent Expansion Program (STEP). Zia holds degrees in mathematics from the University of North Carolina (BS) and the University of Michigan (MS), and applied mathematics from Brown University (PhD).

Peter Youngs, Associate Professor, Department of Curriculum, Instruction, and Special Education, Curry School of Education, University of Virginia

Peter Youngs is an associate professor in the Department of Curriculum, Instruction, and Special Education in the Curry School of Education at the University of Virginia. His research interests focus on education policy effects on teaching and learning in the core academic subjects including state and district policy related to teacher preparation, induction, evaluation, and professional development in the United States and their effects on teachers' instructional practices, commitment to teaching, and retention in the teaching profession.

Youngs’s research has been funded by the Carnegie Corporation of New York, the National Science Foundation, the Spencer Foundation, and the William T. Grant Foundation. Recent publications have appeared in Educational Researcher, Journal of Teacher Education, and Journal of Mathematics Teacher Education. He received the AERA Division K (Teaching and Teacher Education) Early Career Award, and he currently serves as co-editor of Educational Evaluation and Policy Analysis.
HYATT REGENCY WASHINGTON ON CAPITOL HILL
400 New Jersey Avenue N.W.
Washington, DC 20001, USA
T +1 202 737 1234
F +1 202 737 5773
washingtondc.regency.hyatt.com
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- Covered valet parking (fee)

LOCATION
The Hyatt Regency Washington on Capitol Hill is conveniently located two blocks from the U.S. Capitol, minutes to the Walter E. Washington Convention Center and DC’s most popular historic, cultural, dining, and entertainment venues.

TRANSPORTATION:
- Union Station (Amtrak’s headquarters) - 3 blocks / 5 minute walk
- Reagan National Airport - 3.5 miles / 10 mins
- Washington Dulles International Airport - 24 miles / 35 mins

POIN TS OF INTEREST
- U.S. Capitol
- Supreme Court
- Library of Congress
- House and Senate Office Buildings
- National Gallery of Art
- The National Mall featuring famous monuments, memorials, and museums
- The White House
- Smithsonian Museums
- National Portrait Gallery
- National Museum of African American History and Culture
- Museum of the Bible
- Capitol Visitor Center
- Walter E. Washington Convention Center
- Georgetown University Law Center
- Verizon Center / Washington Capitals, Mystics, Wizards, Georgetown Hoyas
- Nationals Park / Washington Nationals
- The Wharf
- Eastern Market

RESTAURANTS & BARS:
- Article One - American Grill: indulge in seasonal flavors on Capitol Hill. Open daily for power breakfast, energizing lunch and relaxing dinner. Breakfast features Hyatt’s signature breakfast menu and a daily breakfast buffet. For lunch, enjoy a selection of creative soups, salads, sandwiches and entrees. Dinner provides an upscale grill menu featuring Certified Angus Beef steaks, chops, and seafood.
- Article One Lounge: lounge provides a prime spot to mingle, catch up on the day’s current events or simply watch for the “who’s who” on Capitol Hill. The lounge is centered by community tables, perfect for meeting friends and colleagues. The lounge offers a selection of appetizers, sandwiches and specialty cocktails.

MEETING & EVENT SPACE:
- A total of 38,000 square feet of event space with a total of 32 meeting rooms and 2,848 square feet of prefunction space
- Thornton Room: a premier event location with the view of Capitol Grounds. Located on the 11th floor, offering 3,048 square feet of function space for more intimate events
- 2nd Floor Conference Level: newly renovated exclusive floor designed for smaller meetings; two pre-function rooms and eight meeting suites
- 11,388 square-foot Regency Ballroom features 18-foot ceilings
- 3,588 square-foot Columbia Ballroom features 12-foot 9-inch ceiling
- Hall of Battles: The Concord, Lexington, and Bunker Hill meeting rooms
- Congressional Room: this unique meeting room facility offers 4,432 square feet of space on the lobby level, primarily for food and beverage functions.
- Meeting rooms offer individual or master controls for heat and AC, sound, music, telephones, multiple electrical and microphone outlets, special lighting effects, as well as 110V single-phase and 230V single-phase electricity.
- High-speed internet access (FI) available (fee)
About the 2017 Noyce Summit Small Group Discussion Sessions

The 2017 Noyce Summit small group discussion sessions will provide additional information for the AAAS Guide to Innovation in Science and Mathematics Preservice Teacher Education and Leadership Development. The development of this guide will include input from leaders in elementary and high schools, state and district education agencies, colleges and universities, and others that recruit, prepare, evaluate and license teachers, as well as current and former Noyce Scholars and Fellows.

How do we best prepare our faculty and structure our departments and institutions to achieve these goals?

1.) Faculty, Departments, and Institutions
   A. How do we better prepare current and future faculty for their role as teachers, guides, and mentors?
   B. How do we help faculty to keep up with new and emerging technology to support STEM teaching and learning?
   C. How do we build a culture that values continued improvement in teaching and learning?
   D. How do we overcome the barriers to departmental and institutional evolution and change? What strategies are effective in breaking down disciplinary "silos"?
   E. Do we need to change and can we change the faculty reward and tenure system?
   F. How can we best handle the special challenges facing community colleges and their faculty? What can we do to aid students in the transition from two-year to four-year programs?
   G. What needs to be done to modernize laboratory and classroom facilities to take advantage of new learning and research technologies and best pedagogical practices?

2.) External Influences and Constraints
   A. How can we adapt to and engage an increasingly diverse student population?
   B. How can we keep pace with the changes in higher education (e.g., changes in student life, increasing costs of education, decreased funding for higher education, increased demand for accountability, etc.)?
   C. How can we strengthen teaching licenses and accreditations given the recommendations in framework and standard documents in teacher education programs?
Small Group Discussion Session Leaders

Nathan Alexander, *University of San Francisco/Morehouse College*
Jaime Arvizu, *California State University, Fresno*
Jose Blackorby, *CAST Inc.*
Hilda Borko, *Stanford University*
Ann Cavallo, *University of Texas at Arlington*
Jeanne Century, *Outlier Research & Evaluation, UChicago STEM Education, University of Chicago*
Scott Dantley, *Dantley and Associates*
Frederick Freking, *USC Rossier School of Education*
Greg Hale, *University of Texas Arlington*
Michelle Head, *Kennesaw State University*
Doug Larkin, *Montclair State University*
Ramon Lopez, *University of Texas at Arlington*
James Matthews, *Siena College*
Melissa McCartney, *Florida International University*
Camille McKayle, *University of the Virgin Islands*
S. Justin Polizzi, *Kennesaw State University*
Ruthmae Sears, *University of South Florida*
Walter Secada, *University of Miami*
Gay Stewart, *West Virginia University*
Marilyn E. Strutchens, *Auburn University*
Sharon Vestal, *South Dakota State University*
J Michael Wyss, *University of Alabama at Birmingham*
Peter Youngs, *University of Virginia*
Session 1: Thursday, July 20, 2017
9:30am - 10:45am

1.1 Teaching Tips: Small Things with Large Effects (Extracts from a Noyce Add-on Class)

Length of Session: 75 minutes

Paul Heideman, College of William and Mary, pdheid@wm.edu, PI

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-Pis, Other Faculty/Staff, Undergraduate and/or Graduate Noyce Scholars

Topic: Resources for Teachers

The William and Mary Noyce program includes a one-credit add-on course, ‘How Students Learn,’ that integrates the neuroscience of learning and memory, metacognition, and learning tools. The course goal is to help prospective teachers understand findings from the science of learning for application to their own teaching and their own learning. This workshop presents selected content and exercises from the class. The selections are a subset of topics identified by class members as most interesting and useful to them as prospective teachers and as learners. The topics are: (1) Why it helps to know how you know, (2) how we build new knowledge from old knowledge, (3) using multiple senses in order to learn better and more efficiently, (4) recognizing when we need to simplify to essentials, and (5) why word problems in the sciences and mathematics are so hard. Stated in other words (the same topics in the same order), (1) metacognition, (2) chunking and expertise, (3) multiple sensory modalities as applied to neostriatal versus hippocampal memory pathways, (4) excess cognitive load, and (5) the challenge of transfer because memories are physical connections from cell-to-cell. Examples and applications will include mathematics and the sciences. The workshop will include interactive demonstrations of approaches. (Some of the content of the workshop is in http://pdheid.blogs.wm.edu/44-2/.) The goals are to gain a better understanding of some of the barriers to learning, provide methods to shrink barriers to learning, and provide ideas to develop long-lasting improvements in student learning skills.

1.2 Engineering Enhanced Science and Mathematics Teaching

Length of Session: 75 minutes

Leslie Lyles, University of Cincinnati, lylesle77@gmail.com, Cincinnati Public Schools, Master Teacher
Lillian Sims, Cincinnati Public Schools, Master Teacher
Amy Jameson, Cincinnati Public Schools, Master Teacher

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Undergraduate and/or Graduate Noyce Scholars

Topic: Resources for Teachers

In this workshop session three master teachers will share engineering-based units they used in their respective urban secondary science or mathematics classrooms. The session will include: a) an overview to the engineering design process used in their units, b) experiential time, where participants will do an introductory engineering challenge to apply the design process, c) wrap up and discussion about important learning points for students and instructional tips for organizing the learning experience and environment for students. The content areas for the units include Algebra, Physics and Chemistry. The presenters will share with the participants a website with over 60 engineering units developed by secondary science and mathematics teachers as part of an NSF funded program. Workshop attendees will take away experience working on an engineering design project, an overview of engineering units appropriate for use in a mathematics or science classroom, a link to a website of resources for more engineering units, and implementation tips and strategies.

1.3 Understanding Real Research: Incorporating Primary Literature into Teacher Prep and Coursework

Length of Session: 75 minutes

Beth Ruedi, AAAS, bruedi@aaas.org, Project Director, Science in the Classroom
Melissa McCartney, Florida International University, mmccartn@fiu.edu, Assistant Professor & Science in the Classroom Research Director
Shelby Lake, AAAS, slake@aaas.org, Program Associate

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Undergraduate and/or Graduate Noyce Scholars

Topic: Resources for Teachers

One of the best ways to introduce students to the process of science is to use primary literature papers. The problem - These articles are typically intimidating - and not just for the students! How can we make primary literature more accessible, and how can we help instructors feel more comfortable using it? This workshop will guide participants through the process of reading primary literature, focusing on reading papers outside their comfort zone. We will then introduce Science in the Classroom (http://www.scienceintheclassroom.org/), an expanding collection of specially selected research articles that have been carefully annotated for teaching. Annotations fall under different categories, such as Glossary and References, which are viewed using our Learning Lens tool. The Learning Lens makes it possible to control which lenses the readers are looking through while
reading the paper, allowing for a variety of different reading and comprehension experiences. All papers are also accompanied by an Educator Guide, and many have data activities - often with data supplied by the authors of the original article. We demonstrate the use of SitC as a teacher prep tool to explore real research within diverse fields of study, and provide suggestions for incorporating these papers into the curriculum. This freely available resource makes it possible for educators and students alike to read and understand a high-quality research paper, immersing them in the process of science as they go.

1.4 An Unusual But Successful Field Project for Supporting the Mathematics and Pedagogy of New Teachers

Length of Session: 75 minutes

James Matthews, Siena College, matthews@siena.edu, PI

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Supporting New Teachers

Research and common sense indicate that students who are engaged in rich, meaningful mathematics programs learn more and perform at higher levels than students who are in narrow, test-prep focused programs. In this very interactive session, participants will learn about and discuss how to incorporate challenging, interesting mathematics into their programs. Can your students name a living professional athlete, musician, actor, or writer? Of course they can. Can they name a living professional mathematician? More importantly, do they know there are professional mathematicians who are working on open problems? Probably not. With a school mathematics conference, students learn about 21st century mathematics. A good school mathematics conference is similar to a good school science fair. We will share how we have had a school successfully conduct mathematics symposia or conferences based on mathematical problem solving. Workshop participants will work on some of the problems we have used and some unsolved problems that are accessible to middle school students. The conferences we will describe are modeled after professional meetings of the Mathematical Association of America. They include poster sessions, contributed paper sessions, and keynote presentations. In addition to examining and discussing mathematics problems that may be used, participants will learn about the logistics of running a conference, and strategies for success. By their nature, these activities heavily engage students in Common Core Standards for Mathematical Practice. Researchers (like Jo Boaler) have documented how programs that include this type of rich mathematics result in higher levels of performance.

1.5 Teacher Noticing: A Pathway to Maximize Learning

Length of Session: 75 minutes

Behailu (Alu) Mammo, Hofstra University, matbzm@hofstra.edu, Principal Investigator

Target Audience: Evaluators/Education Researchers, Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Supporting New Teachers

In Teacher Education literature, the phrase Teacher Noticing is used to encompass the process through which teachers manage the "blooming, buzzing confusion of sensory data" with which they are faced, that is, the ongoing information with which they are presented during instruction. Studying teacher noticing is important because it is at the heart of managing the most salient features of teaching. In the workshop, we will (a) give an overview of teacher noticing, (b) present our preliminary findings regarding our Noyce Scholars noticing practices, and (c) discuss how recent developments in cognitive science can foster teacher noticing. The audience will be presented with a video clip and practice noticing.

1.6 Teaching a Diverse Student Population

Length of Session: 75 minutes

Karen Nave, Rio Salado College, Karen.Nave@riosalado.edu, Noyce Scholars Program Manager
Jennifer Gresko - Jennifer.Gresko@riosalado.edu ; Rio Salado College; PI SMILE Noyce Grant
Kim Tobey - Kimberly.Tobey@riosalado.edu; Rio Salado College; Director, Community Partnerships - Educator Preparation Field and Student Teaching Experiences
Annette Wright-Smith - drannette63@msn.com - Rio Salado College Noyce Scholar - High School Anatomy, Physiology teacher at Metro Tech in Phoenix, AZ
Michael Quelle - redbaron826@yahoo.com; Rio Salado College Noyce Scholar; High school math teacher at Red Mountain High School in Mesa, AZ

Target Audience: Higher Education Institution Administrators, Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Teaching a Diverse Student Population

Often times as college and university educator preparation programs integrate strategies for teaching and learning, the primary focus relates to preparing the pre-service teacher to meet the needs of future students they will be teaching. In
truth, Noyce Scholar Programs must also address the diverse needs of the students receiving instruction within their higher education programs. The National Center for Education Statistics (NCES) has identified various characteristics that are common to nontraditional students such as being financially independent, single parents, work fulltime, and/or have children or dependents. In an effort to adequately address the diverse needs of our students we must first take into consideration the diverse needs of Noyce Scholars; understanding their culture, their learning styles, and their barriers for success. Join our SMILE team members for a practical discussion that will highlight Rio Salado College’s program enhancements and policies for non-traditional student populations, successful partnerships and programs for understanding cultural competency within high need schools, and hear from the field of Noyce Scholars who are actively impacting the diverse needs of Arizona classroom students. You won’t want to miss this conversation. If Noyce or any program is going to be successful then we must act as one to address the needs of students across the grade continuum and recognize that the strategies, cultures, and communities are not all that different. An effective Noyce Scholar program must model the same practices of instruction with their pre-service candidates as we ask them to model with their students in the classroom.

1.7 Embedding Language and Literacy in the Science Classroom: Meeting the Needs of Diverse Students

*Length of Session: 75 minutes*

Jennifer Renn, Center for Applied Linguistics, jrenn@cal.org, Director, Adult Language and Literacy Education Research
Annie Duguay, Center for Applied Linguistics, aduguay@cal.org, Director of PreK-12 English Learner Professional Development
Jillian Wendt, University of the District of Columbia, jillian.wendt@udc.edu, Assistant Professor of Science Education
Maria Peters, University of the District of Columbia, maria.peters@udc.edu, Noyce Fellow
William Willis, University of the District of Columbia, william.willis@udc.edu, Noyce Fellow

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project Pls, Co-Pls, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Teaching a Diverse Student Population

Introducing students to academic language is a challenge for all teachers, especially as classroom content becomes more complex with the integration of college and career readiness standards. This workshop will focus on the collaboration between instructional experts on language and literacy development from the Center for Applied Linguistics (CAL) and the University of the District of Columbia (UDC) to create lesson modules related to developing language skills in the middle school science classroom. These modules, which focus on academic language development for students who are English learners or speakers of non-standard dialects, are part of UDC’s Master’s in Teaching (MAT) program for middle school science educators. Drawing on the literature surrounding the academic language of science and language development in English learners, the content of these modules was developed to be appropriate for teacher educators and science teachers at all levels. The module content was designed around three components: linguistic understandings (the idea that home language styles or languages are valued while teaching academic English); critical language awareness (the idea that language is a meaning-making social enterprise); and pedagogical modeling (classroom strategies and best practices are embedded throughout). In this workshop, we will describe the collaboration between CAL and UDC, how the modules were created, observations from the delivery of the modules, and results in terms of how teacher candidates applied the information and strategies directly with students. We will also introduce participants to samples of module content by engaging them in hands-on activities and discussing classroom implications and outcomes.

1.8 Integrating Research into STEM Teacher Prep Through Professional Learning Communities

*Length of Session: 60 minutes*

Sabrina Hessinger, Armstrong State University, Sabrina.Hessinger@Armstrong.edu, PI

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project Pls, Co-Pls, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

Professional learning communities are prevalent in K-12 education as the avenue through which teachers engage in meaningful professional development. In Armstrong Noyce MASTERS: Math and Science Teacher Education Readiness Scholarships, we have implemented a novel and replicable model for PLCs, called Future Teacher Professional Learning Communities (FTPLCs). Our FTPLCs exhibit the well-known defining elements of learning communities, but they are novel in their member composition and in their engagement of pre-service teachers in scholarship. Each FTPLC is composed of STEM faculty, education faculty, undergraduate and graduate pre-service teachers, and teacher mentors from public schools.
This broad community of educators promotes the integration of content knowledge, pedagogy, and teacher practice knowledge into the development of the Noyce scholars as teacher leaders. Additionally, educational research is infused into all FTPLC activities. Scholars are exposed to research theory and methodology through collective study of Opie, 2004. Scholars review research literature on effective teaching practices in STEM and apply their learning to the development of classroom materials. The FTPLCs also work collaboratively on an ongoing research project on a topic of their choice in STEM education. In this workshop we will open with a brief description of our PLC model and the impact on teaching. The session participants will then be engaged in and asked to critique several authentic learning community activities, including community building, lesson plan analysis, collective literature review, and assessment of learning community characteristics. We will provide the tools we have developed to facilitate each of these activities in the FTPLCs.

### 1.9 Moving Beyond 'Fun': Selecting Cognitively Demanding Science and Mathematics Tasks

**Length of Session: 60 minutes**

Kirby Whittington, Florida State University, kmb07t@my.fsu.edu, Graduate Research Assistant
Miray Tekkumru-Kisa, Florida State University, mtekkumrukisa@fsu.edu
Karen Rose, Florida State University, kr04@fsu.edu
Sherry Southerland, Florida State University, ssoutherland@admin.fsu.edu

**Target Audience:** Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

**Topic:** Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

Years of national standardized assessment data have continually shown marginalized groups of students performing below their more affluent counterparts (U.S Department of Education, 2016). To move past thinking about these patterns as an achievement gap to framing this problem as an opportunity gap (Gorski, 2013). Through this lens, mitigating these gaps will require changes in the types of instruction typically seen in high needs schools (Haberman, 1991) to mirror the rigorous learning opportunities that have been shown to increase student learning. One of the ways this can be done is through the tasks or the work that teachers assign their students (Tekkumru-Kisa, Heister, & Kisa, 2017). Tasks are seen as an important aspect of instruction because they both implicitly and explicitly direct students’ attention to what should be learned and how it should be learned (Doyle, 1983).

Therefore, it will be important for teachers in high-needs schools to use tasks that are both of high cognitive demand and aligned with recent reform efforts. In this workshop, we will engage participants in learning about the research-based task frameworks for both math and science, use the frameworks to look at math and science tasks, and discuss how these can be implemented in high-needs schools. The Task Analysis Guide in mathematics (TAG; Stein et al., 2000) and the Task Analysis Guide in Science (TAGS; Tekkumru-Kisa, Stein, & Schunn, 2015) have been used by teachers and teacher educators for thinking about tasks used in classrooms.

### 1.10 Managing Scholarship Service Obligations and Granting Exemptions

**Length of Session: 60 minutes**

Gregory Phelan, State University of New York College at Cortland, gregory.phelan@cortland.edu, PI

**Target Audience:** Project PIs, Co-PIs, Other Faculty/Staff

**Topic:** Project Management

This workshop explores steps to take now that your grant is active to help ensure that all your Noyce Scholars are supported while they transition from student to teacher. We will explore topics including how to build administrative structures to ensure compliance with service obligations, how to keep in touch with your scholars once they graduate, and the topic of granting exceptions for scholars that are not able to meet their service obligation.

### 1.11 Secondary Teaching Myth Busters: Benefits Compared to Industry and University Teaching

**Length of Session: 60 minutes**

Kristine Callan, Colorado School of Mines, kcallan@mines.edu, Teaching Faculty
Gay Stewart, West Virginia University, gbstewart@mail.wvu.edu, Director

**Target Audience:** Higher Education Institution Administrators, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

**Topic:** Recruitment, Retention, and Marketing Strategies

In this workshop, participants will analyze data on secondary teachers' compensation and benefits, and compare this data
with that of university instructors and industry workers. Data on job satisfaction for some of these careers will also be shared. This activity will model an activity that we’ve engaged in with local teachers, industry, and state representatives in Colorado. Participants will then be ready to mine for similar types of data in their own community. Lastly, we will ask participants to reflect on what they found and how their views toward the secondary teaching profession may have changed.

### 1.12 Equity-Based Interdisciplinary Collaboration at an Urban Commuter Campus

**Length of Session:** 60 minutes

Janelle Johnson, Metropolitan State University of Denver, jjohn428@msudenver.edu, PI, Assistant Professor-STEM Education

**Target Audience:** Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-Pis, Other Faculty/Staff

**Topic:** Teaching a Diverse Student Population

This session is based on work carried out under a Noyce capacity building grant in 2015-2016 and used as the foundation for a funded S&S program. Our interdisciplinary team utilized an equity lens to investigate the research question: Taking into account its urban commuter setting and the needs of its first generation and underrepresented student population, what do stakeholders describe as key elements of a successful program design? Research focused on listening to and synthesizing the perspectives of all program stakeholders. Workshop facilitators will engage participants in small and whole group reflection and discussion with data and findings from our own institutional capacity building. Collaborative discussion in this workshop is based on key findings, including the salient role of finances in future and current students' academic trajectories; the need for continuous attention to institutional navigation for first generation students; communication between collaborators; and the ongoing need to increase student-centered pedagogy. Overall, our research indicated the need for ongoing use of an equity framework. Session participants will develop some essential questions to frame the challenges they may face in their own programs, map out their own stakeholders, and discuss potential modifications to their own data collection and analysis for more equitable program outcomes.

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The following workshops are 30-minute workshops, sharing the same breakout rooms during Session 1:

### Session 1:13a: 9:30am-10:00am

**1.13a Preparing Preservice Teachers to Work with Struggling Mathematics Learners**

**Length of Session:** 30 minutes

Margaret Mohr-Schroeder, University of Kentucky, m.mohr@uky.edu, PI
D. Craig Schroeder, Fayette County Public Schools, craig.schroeder@fayette.kyschools.us, K12 Teacher Partner
Tyler Waters, Fayette County Public Schools, tyler.waters@fayette.kyschools.us, Noyce Fellow
Michael Delfino, Fayette County Public Schools, michael.delfino@fayette.kyschools.us, Noyce Fellow

**Target Audience:** Evaluators/Education Researchers, Noyce Master Teachers, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators

**Topic:** Innovative Noyce Program Practices and Teacher Preparation Models (including new courses and degree requirement and early field experiences)

According to the Teaching Principle from the Principles and Standards of School Mathematics, 'effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well' (NCTM, 2000, p. 17). Traditionally, teacher education programs have placed little emphasis on preparing mathematics teachers to work with struggling learners (Allsopp, Kyger, & Lovin, 2007). The purpose of this session is to discuss how a course situated in an informal learning environment affects the preparation of secondary mathematics prospective teachers to work with students who struggle in mathematics.

### Session 1:13b: 10:10am-10:40am

**1.13b Preparing STEM Teachers to Teach English Language Learners (ELLs): An Innovative Sustainable Teacher**

**Length of Session:** 30 minutes

Serigne Gningue, Lehman College/CUNY, serigne.gningue@lehman.cuny.edu, PI
Gillian Bayne, Lehman College, gillian.bayne@lehman.cuny.edu, Co-PI
Sunyata Smith, Lehman College, sunyata.smith@lehman.cuny.edu, Co-PI
WORKSHOP ABSTRACTS

Orlando Alonso, Lehman College, orlando.alonso@lehman.cuny.edu, Co-PI
Gillian Bayne, Lehman College, gillian.bayne@lehman.cuny.edu, Co-PI
kristina Perrotto, New World High School, mentor teacher, kristinaperrotto@gmail.com
Nelson Caro, Lehman College, nelson.caro@lc.cuny.edu, Noyce Teacher
Eric Agyenim-Boateng, Lehman College, agyenimboateng@gmail.com, Noyce Scholar

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-Pis, Other Faculty/Staff, Undergraduate and/or Graduate Noyce Scholars
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

This paper focuses on aspects of an emerging model of a clinically-rich and sustainable teacher semi-residency program that highlights the power of thoughtful and intentional collaboration in serving the needs of ELLs. We examined Year I and Year 2 focus group and survey data from Cohort I participants, two (2) mathematics and four (4) science scholars. Focus groups data showed that Scholars provided mixed responses, from believing that the coursework gave them strong foundation to feedback on how they could better impact their skills to teach math and science in an urban context. Survey data supported such findings in looking at the perceived impact of the program coursework and internship on Scholars’ overall preparedness to teach in schools. Scholars believe the internship experience has done the most in preparing them for teaching in schools, as all six provided the highest rating of 8.

We looked at collaborative practices beyond teacher-teacher interactions, through Mentor-Apprentice and Apprentice-Students relationships, and found that effective collaboration was the best indicator of success of this program. While the academic language of scholars related to language acquisition, pedagogical content knowledge, and literacy on the content is still underdeveloped, they managed to identify a group of core strategies they could put into practice in an apprenticeship environment, while maybe leaving aside things they did not quite fully understand. This is interpreted as a justification of the different levels of response to awareness of the teaching tools they are beginning to learn and for a later usage.

Session 1:14a: 9:30am-10:00am
1.14a Exploring Noyce Teacher Retention: The Usefulness of Social Network Analysis

Length of Session: 30 minutes
Meltem Alemdar, Georgia Institute of Technology, meltem.alemdar@ceismc.gatech.edu, PI
Christopher Cappelli, Georgia Institute of Technology, chris.cappelli@ceismc.gatech.edu, Co-PI

Target Audience: Evaluators/Education Researchers, Project PIs, Co-Pis, Other Faculty/Staff
Topic: Research and Evaluation

Teacher effectiveness and retention are affected by the strength and nature of teachers’ collaborative networks, both inside and outside of their school settings. When teachers have a strong support network, they are more likely to teach effectively and to remain in high-needs schools. Investigations of teachers’ personal networks with the goal of explaining outcomes of interest, such as teacher retention or effectiveness, often employ network measures intended to teachers’ social capital, or the resources and information available to the teacher through connections to other actors. Different aspects of a teacher’s connections with actors may be examined to capture variations in social capital, such as the number of other actors in the network, the frequency of contact with actors, the quality or value of connections to actors, or the expertise of actors in the network. This workshop will provide an introduction to social network analysis and describe how it can be used at the program level to assess Noyce teachers’ collaboration inside and outside of their classrooms, schools, and districts. Specifically, the workshop will demonstrate the use of an ego-network analysis to examine Noyce teachers’ personal support networks and explore how teachers’ social capital may influence retention in high needs schools.

Session 1:14b: 10:10am-10:40am
1.14b Looking at the Data: Comparing STEM vs. Non-STEM Majors as Career Changer Teachers

Length of Session: 30 minutes
Lienne Medford, Clemson University, lienne@clemson.edu, Professor, PI of grant
Michelle Fowler, Clemson University, mefowler@greenville.k12.sc.u, Doctoral student on grant

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-Pis, Other
Faculty/Staff
Topic: Research and Evaluation

Session will review data and conclusions from two year's of research in a longitudinal study examining an MAT program's graduates over 12 years. The study sought to compare STEM vs. non-STEM majors as career changers in the middle level math and science classroom. Results of the study will be shared (qualitative and quantitative). Presenters will discuss potential reasons for outcome of study and the implications it may have for recruiting career changers into STEM teaching.

Session 1:15a: 9:30am-10:00am

1.15a Social Network Analysis in Teacher Leadership

Length of Session: 30 minutes

Brandon Ofem, University of Missouri-St. Louis, ofemb@umsl.edu, Co-PI
S. Justin Polizzi, Kennesaw State University, spolizzi@kennesaw.edu, Co-PI
Greg Rushton, Stony Brook University, gregory.rushton@stonybrook.edu, PI

Target Audience: Evaluators/Education Researchers, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators
Topic: Teacher Leadership

Teacher leadership has largely been investigated as what existing teacher leaders do, but less is known about how to move teachers along a measurable trajectory toward teacher leadership. In our project to develop chemistry and physics teacher leaders, we have investigated social network theory as a lens for understanding how teachers exhibit leadership. We have provided Master Teaching Fellows with basic professional development in network and organizational behavior, in an effort analogous to the training of leaders in MBA programs. Through discussions of distinct network structures, we have identified examples of how different social networks are employed in education for collaboration, recruitment and new initiatives. Analysis reveals utility for a hybrid type of teacher leader network with a dense local core and other geographically distributed contacts. Social Network Analysis of teacher leader networks supports the development of hybrid networks and further consideration of the extent to which teacher networks are geographically distributed. Our initial studies suggest multiple possibilities for using SNA to investigate teacher leadership through spheres of influence, longitudinal changes in contacts, impacts of interventions, selection for leadership initiatives, and professional development activities.

Session 1:15b: 10:10am-10:40am

1.15b UR Noyce MTF Fellows' Reflections on Year 2: Supporting Teacher Leader Development

Length of Session: 30 minutes

Cynthia Callard, University of Rochester, ccallard@warner.rochester.edu, Faculty/PI
Andrea Polanski, Rochester City School District, andrea.polanski@rcsdk12.or, Rochester City School District Science Teacher, MTF Fellow
Renee Williams, Geneva City School District, rwilliams@genevacsd.or, Mathematics Teacher, MTF Fellow

Target Audience: Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators
Topic: Teacher Leadership

Two thematic components of the University of Rochester's MTF Phase II project 'Leveraging Unique Opportunities to Develop STEM Teacher Leaders for Urban Schools' are: (1) deepening Fellows' understanding of theory in order to inform practice and (2) engaging in 'action research' through exploring a 'problem of practice.' In this session, we will provide an overview of our project, its goals and primary activities, and how we are working toward developing teacher leadership in our urban and 'urban rural' schools. Two Fellows will share their experiences, highlighting the project activities above that they identified as having the greatest impact on their practice after completing the second year of the Fellowship. We will discuss how these experiences support the development of teacher leadership over time. Participants will be invited to ask questions and consider implications for their own projects.

Session 2: Friday, July 21, 2017
10:15am - 11:15am

2.1 Exploring Teaching: A Multi-dimensional Summer Program for Interns, Scholars, Graduates - and Kids!

Length of Session: 60 minutes

Janet Barnett, Colorado State University - Pueblo, janet.barnett@csupueblo.edu, PI; Internship Lead Mentor
Ariana Carlyle, snowjjade@yahoo.com, Fountain Middle School, CSU-Pueblo Noyce Graduate, Former Scholar/Intern

Target Audience: Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

This workshop showcases the Colorado State University-Pueblo (CSU-P) Noyce Scholars ‘Explore Teaching’ Summer Internship Program. Built around a Noyce Summer Math Academy for students entering grades 7-10, this program offers interns from CSU-P and its community college partners the opportunity to work with a highly diverse group of students under the mentorship of university disciplinary faculty and master secondary teachers. Interns and mentors collaborate closely as co-teachers to plan, deliver and assess every aspect of Academy instruction. In turn, students from two high-needs K-12 partner districts receive a no-cost mathematics experience designed to benefit students who struggle, those in need of some extra challenge, as well as those ‘in the middle’. The program further offers leadership opportunities to Noyce Scholars and Graduates through its ‘Junior Mentor’ and ‘Senior-mentor-in-training’ components. Through a series of Q&A mini-sessions, we will examine the design and implementation of the program’s various dimensions. Who are the Academy kids? What does Academy instruction look like? How is it differentiated to work for such a wide range of students? How do students respond? How are interns, junior-mentors and senior-mentors-in-training recruited and selected? What training do they receive? Do many go on to pursue teaching? For those that do, how does immersion in the internship, junior-mentor or senior-mentor-in-training experience impact their later teaching? Workshop attendees will also participate in activities that mimic aspects of the internship program, as well as activities that invite reflection on the immediate and long-term impact of such an intensive broad spectrum exploration of teaching.

2.2 Are ALL field-experiences Created Equal?

Length of Session: 60 minutes

Karen Anderson, Stonehill College, karenanderson@stonehill.edu, Professor
Jenna Rapoza, Stonehill College, j.rapoza14@gmail.com
Rachel Vieira, Stonehill College, rvieira9519@gmail.com

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators

Topic: Partnerships with High-Need Schools and Districts

This session reports on an innovative early field-experience - the NUMB3RS Project - introduced in the spring of 2014 as one element of the Robert Noyce Teacher Scholarship Program at Stonehill College. This supervised field-experience was collaboratively designed by a multi-disciplinary team of mathematics and education faculty and College administrators, together with faculty and administrators from our partner districts and personnel from our non-profit partners. Our primary goals were to: (1) encourage our PSTs to question the status quo (more traditional methods of teaching mathematics typically seen in many K-12 classrooms) by providing clear connections between the content and pedagogy espoused in on-campus coursework and the instructional practices PSTs experience in field-experience, (2) provide PSTs with multiple opportunities to design and implement instructional routines rooted in the standards for mathematical practice, and (3) provide targeted support to our community partners. As demonstrated through longitudinal data (weekly reflections, feedback from our external reviewer), participation in the NUMB3RS Project not only exposed PSTs to instructional routines rooted in the standards for mathematical practice, involvement also enabled PSTs to see connections between negative views towards mathematics (expressed by themselves, their peers, or the students they are working with) and how they perceive mathematics is currently being taught. Through exposure to NUMB3RS Projects, PSTs report beginning to see themselves as change agents, capable of changing their students’ views towards mathematics through altering the way mathematics is experienced by K-12 students. Throughout the session, attendees will participate in several mathematical experiences designed as part of the NUMB3RS Project.

2.3 Using a Professional Learning Community to Retain STEM Teachers

Length of Session: 60 minutes

Sharon Vestal, South Dakota State University, sharon.vestal@sdstate.edu, PI

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators

Topic: Recruitment, Retention, and Marketing Strategies

In 2007, we received Noyce funding (DUE-0733691) to begin the Rural Enhancement of Mathematics And Science Teachers (REMAST) Scholarship Program. During our phase I funding, we received supplemental funding to begin a summer conference for the REMAST alumni and scholars. We applied for and received phase II funding (DUE-1439789) in 2014 to continue the REMAST program and to evaluate the phase I program and its success. Some aspects of the REMAST Professional Learning Community include the annual summer conference, pre-service teacher mentoring, book studies with scholars, a Facebook group, and continued communication with alumni. Through May 2017, we have awarded scholarships to 54 STEM majors, 52 of which completed a STEM degree with secondary certification. Of the 52 STEM teachers, 39 are employed as teachers for the 2017
-2018 school year, 2 are in graduate school, 2 are seeking a teaching position, 6 are not teaching, and 3 have unknown status. Our teacher retention rate for this program is a solid 75%. We wanted to evaluate why our program is successful so we created a survey based on the Early Career Teacher (ECT) Resilience Framework from Johnson et al, a study done in Australia. Based on the survey results as well as a focus group, interviews, and our Facebook group, we have found that the keys to our success are Relationships and Teacher Identity. During this workshop we will discuss these results in hopes that other Noyce programs can replicate them.

2.4 Using the Fold-and-Cut Theorem to Engage Students in Mathematics

Length of Session: 60 minutes

Elsa Medina, Cal Poly State University, San Luis Obispo, emedina@calpoly.edu, Professor
Amelie Schinck-Mikel, Associate Professor, aschinck@calpoly.edu, Cal Poly State University, San Luis Obispo
Hayley Cushing, hcushing@calpoly.edu, Pre-service mathematics teacher, Cal Poly State University, San Luis Obispo
Maria Ramirez, maria9653@gmail.com, Pre-service mathematics teacher, Cal Poly State University, San Luis Obispo

Target Audience: Noyce Teaching Fellows, Undergraduate and/or Graduate Noyce Scholars
Topic: Resources for Teachers

Did you know that you can fold paper so that ANY shape with straight edges can be cut out with a single straight cut? In this session, participants will engage in an exciting hands-on activity and discover this amazing result. We will discuss the underlying mathematical concepts related to high school mathematics.

2.5 Supporting New Teachers with Ambitious Science Teaching

Length of Session: 60 minutes

Heather Johnson, Vanderbilt University, heather.j.johnson@vanderbilt.edu, Assistant Professor of the Practice of Science Education
Doug Larkin, larkin@montclair.edu, Montclair State University, Associate Professor in the Dept. of Secondary and Special Education
Kirsten Mawyer, kmawyer@hawaii.edu, University of Hawaii at Manoa, Assistant Professor of Secondary Science

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars
Topic: Supporting New Teachers

According to Ambitious Science Teaching (http://ambitiousscienceteaching.org/) three common problems for students trying to learn science are: they experience instruction as a series of unrelated and isolated lessons, they do not know why they are doing particular science activities, and they do not see how science relates to their everyday experiences. This raises the question: what kinds of learning experiences do students need in order to fully engage in meaningful forms of science learning? This workshop will introduce teachers to the Ambitious Science Teaching Framework by exploring a puzzling real-world phenomenon through eliciting student ideas, constructing a model, carrying out investigations, analyzing data, engaging with peers in science talk, and developing a written explanation. We will explore how to use this framework to engage students of all backgrounds to deeply understand science ideas, participate in the activities of the discipline, and solve authentic problems. This workshop will focus on supporting new teachers through the use of the specific tools, and participants will be introduced to research-based core practices of high quality science teaching. This will be an interactive session in which participants have the opportunity to ask questions and discuss how they can use Ambitious Science Teaching in their own diverse teaching contexts.

2.6 Stories from the Field - In-service STEM Teachers Discuss Pivotal Moments as Noyce Scholars

Length of Session: 60 minutes

Steven Fletcher, St. Edward’s University, stevenf@stedwards.edu, Associate Professor - Secondary Education, Dept. Chair-Teacher Education, PI-Noyce Phase II
Felice Mueller, fmueller@dallasisd.org, Skyline HS, Math Teacher
Chelsie Newman, chelsienewman@yahoo.com, Humble ISD, Biology Teacher
Shelly Rodriguez, rodriguez@uteach.utexas.edu, UTeach, Master Teacher
Erica Valdez, erica.valdez@dvisd.net, Del Valle ISD, Biology Teacher

Target Audience: Evaluators/Education Researchers, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars
Topic: Supporting New Teachers

This workshop is designed to give an authentic voice to three Scholars from the St. Edward’s University (SEU) Noyce Scholarship Program who are currently teaching in the field. Often, educational researchers explore issues concerning new or mid-career teachers without building space for teacher voice during dissemination of results. At the same time, teacher
leadership opportunities are often constrained during the school year due to the daily grind of practice and administration. In this session, presenters will build leadership skills by engaging in a professional dialogue with participants, and will inform conversations about effective STEM teacher development from induction to mid-career. Each scholar will provide an overview of pivotal moments in their preparation and support through the Noyce program at a small Liberal Arts University in Texas. The preservice program included a field-based teacher preparation program and extensive induction and teacher leadership support over the last five years for Noyce Scholars. Scholars will share elements of the program that helped them develop professionally as well as elements that were not useful for their growth. Participants in the session will be invited to describe and compare their own Noyce program support mechanisms with presenters in an interactive discussion throughout the presentation as a mechanism for discerning trends and potential tools for effective retention and sustainability of STEM teachers in the field. The project PI and a project mentor will provide an overview of the elements of the SEU Noyce program at the beginning of the session and will facilitate the discussion.

2.7 What is Culturally Responsive Mathematics Teaching and Why Does it Matter?

Length of Session: 60 minutes

Mark Ellis, California State University, Fullerton, mellis@fullerton.edu, Professor, Secondary Education  
Susanna Meza, Mathematics Teacher and Noyce Teaching Fellow, Anaheim Union High School District  

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars  
Topic: Teaching a Diverse Student Population

We will engage participants in examining historical outcomes of school mathematics in the U.S. and have them consider, through an interactive case study, how culturally responsive mathematics teaching might alter these patterns, particularly for historically underserved populations. We will then introduce a reflection framework that supports the design of culturally responsive mathematics lessons, share examples of putting this into practice, and discuss the challenges of this work.

2.8 Learning Gains Across Subgroups within PET High School Classrooms

Length of Session: 60 minutes

Jennifer Keil, University of Colorado Boulder, jenniferkeil11@gmail.com, Master Teacher  

Target Audience: Evaluators/Education Researchers, Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators  
Topic: Teaching a Diverse Student Population

The Physics and Everyday Thinking High School (PET-HS) curriculum engages students in science practices of generating and defending claims using evidence and argumentation as a means of developing and formalizing physics principles. This study focuses on how students that are underrepresented or under performing in traditional physics classes respond to the PET-HS curriculum. Students in PET-HS classes in two different schools were given the same quizzes before and after developing ideas about positive and negative velocity as well as similar questions on the semester final exam. This method was replicated for additional topics throughout the 2016-17 school year, including Newton’s second law and gravitational acceleration. Findings suggest that students from underrepresented groups show no significant difference in learning gains compared to students in majority groups. We will discuss and demonstrate how the PET-HS curriculum facilitates a learning environment where all students are able to access scientific principles and practices.

The following workshops are 30-minute workshops, sharing breakout rooms during Session 2:

Session 2.9a: 10:15am-10:45am

2.9a Using Internships to Engage and Develop Prospective STEM Teachers

Length of Session: 30 minutes

Liz Gron, Hendrix College, Gron@hendrix.edu, Noyce co-PI and Professor of Chemistry  
Dionne Jackson, jackson@hendrix.edu, Hendrix College, Project PI and Associate Professor of Education  

Target Audience: Noyce Master Teachers, Project PIs, Co-PIs, Other Faculty/Staff  
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

Converting STEM students into STEM teachers requires engagement without the pressure of commitment. During the last four years, the Hendrix Noyce STEM Teacher Education in the Arkansas Delta (Hendrix N-STEAD) program has created a six-week paid summer internship for freshman or sophomore STEM majors designed to help students develop an appreciation for, and an interest in, teaching. Ten different students participated in the internship over the
course of four years. Our original internship program, designed using an undergraduate laboratory research model (co-PI L. Gron is a chemistry professor) focused on our one-week science camp for underprivileged elementary school children. The interns developed activities and assessments for the camp. We believed that this emphasis would provide a feeling of ownership. However, internship assessments, pre- and post- surveys, as well as journals kept during the camp session, indicated that this narrow focus neither increased the interns' respect for teaching as a profession nor enhanced their love of teaching. The re-tooled internship was informed by literature which suggested that certain dispositions (e.g. an interest in social justice) and experiences (e.g. interacting with positive role models/mentors) would better promote an interest in the teaching profession. New internship activities included lunch discussions of scholarly articles on teaching and poverty, teaching observations and discussions with teaching professionals in well-resourced and high-needs schools (Arkansas Delta), and multiple informal teaching opportunities. These changes created a broader mentoring community, a better understanding of the needs and challenges of teaching, and a more positive internship experience.

Session 2.9b: 10:45am-11:15am

2.9b The Ecology of Teacher Preparation in Arizona Borderlands

Length of Session: 30 minutes

Henrietta Kralovec, University of Arizona South, kralovec@email.arizona.edu, Associate Professor
Alison Van Gorp, avangorp@email.arizona.edu, UA South, NSF Grant Manager

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, School and District Administrators
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

This workshop explores the changing landscape for teacher education across the country by focusing on the current ecology of teacher preparation in Arizona. In May, the Arizona governor relaxed the requirements to become a teacher, allowing uncertified teachers, with no education background to teach in Arizona schools. Clearly a response to the enormous teacher shortage in Arizona, were 22% of new teachers leave after the first year. This new landscape requires a new approach to teacher preparation that is focused on these new teachers who enter the classroom with no formal training. This presentation fully explores the needs of this category of teachers and how the Noyce Border Scholars (NBS) program at the University of Arizona South prepares new teachers to enter classrooms as they are becoming certified. Evidence from a five-year Transition to Teaching grant drove the design of the Noyce Border Scholars project. The presentation goes on to outline the work of the NBS project, a project that just completed its first year and whose goals include: Goal I: Recruit and prepare STEM teachers to work in AZ-Mexico border area schools; Goal II: Contribute to diversity and retention in STEM positions at partner LEAs; Goal III: Increase in organizational capacity of the UAS M.Ed. program. A full discussion of the approach, outcomes and broader impacts of the NBS project will provide an understanding of this context-specific teacher preparation program that responds to the new ecology of teacher preparation.

Session 2.10a: 10:15am-10:45am

2.10a The Role of Culture and Place in Empowering Pre-service and In-service Teachers as STEMS2 Educators

Length of Session: 30 minutes

Tara O'Neill, University of Hawaii - Manoa, toneill@hawaii.edu, Director, Institute for Teacher Education - Secondary Program, Director, Curriculum Studies STEMS2 master's concentration, Associate Professor, Science and STEM/STEMS2 education

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Non-Profit Organization Personnel, Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

This session provides an overview of two innovative (undergraduate and graduate) teacher preparation programs designed around a new education construct call STEMS2. STEMS2 (O'Neill, Ah Sam, Jumalon, & Stuart, in press) integrates science, technology, engineering and math (STEM) with the social sciences and sense of place (S2). The undergraduate program discussed is the Institute for Teacher Education (ITE) Secondary Integrated STEM licensure program. The graduate program is the STEMS2 master's concentration offered via the department of Curriculum Studies in partnership with ITE Secondary. Both programs have a unique integrated content design and hybrid (in-person and on-line) delivery that begins with three weeks of intensive, community-based, face-to-face class sessions in the
summer, followed by on-line classes in the fall and spring, and ending with three weeks of intensive, community-based, face-to-face session in the second summer. Two main findings have come from the early evaluation of these new programs. First, integrating sense of place and the social sciences with STEM, results in a stronger sense of purpose for teaching and learning STEM content. Second, participation in the STEMS2 master’s has enabled pre-service and in-service educators to build connections between everyday life in their communities and STEM content and has challenged them to address how STEM is being used and should be used to impact our ‘places’.

Session 2.10b: 10:45am-11:15am

2.10b High Impact Experiences: A Two-Week Urban Immersion

Length of Session: 30 minutes

Tyrone Washington, Millersville University, twashington@millersville.edu, Co-PI
Janet White, jwhite@millersville.edu, Millersville University, PI

Target Audience: Project PIs, Co-PIs, Other Faculty/Staff
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

This workshop will include a detailed description and discussion of the transformational aspects of a two-week Philadelphia Urban Seminar. Our Noyce Scholars consistently rank this immersion experience as one of the most valuable experiences of the Millersville University Noyce Scholars Program. This seminar allows preservice teachers to personally confront the stereotypes of inner cities. Through a variety of unique encounters, students gain the experience to be better teachers by understanding and interacting with Philly’s one-of-a-kind urban culture. Not only do students gain valuable teaching experience, they are also immersed into the city’s urban community. Through community service, classroom experiences, and intensive interaction with colleagues as well as students, our Scholars often leave with a new outlook on education.

Session 2.11a: 10:15am-10:45am

2.11a Sometimes You Just Gotta Say 'No'

Length of Session: 30 minutes

Andre Green, University of South Alabama, green@southalabama.edu, PI

Susan Martin, ferguson@southalabama.edu, University of South Alabama, Co-PI

Target Audience: Project PIs, Co-PIs, Other Faculty/Staff
Topic: Recruitment, Retention, and Marketing Strategies

As recruiters of future math and science teachers we are eager to find students with STEM backgrounds to be part of our Noyce network of educators. While we extend the invitation to participate in the pre-residency experience to any candidates with a qualifying undergraduate major and appropriate admission criteria, we find that some who apply do not necessarily have the dispositions necessary for being a success in the classroom. We have learned through our successes and trials that sometimes it is necessary and even beneficial to those who apply to redirect candidates who would not likely be successful classroom teachers. We want to discuss with you why, ‘sometimes you just gotta say ‘NO’.’

Session 2.11b: 10:45am-11:15am

2.11b Recruit. Engage. Reflect: Increasing the STEM Teacher Pipeline

Length of Session: 30 minutes

Dionne Jackson, Hendrix College, jackson@hendrix.edu, Noyce PI and Associate Professor of Education
Liz Gron, gron@hendrix.edu, Hendrix College, Noyce Co-PI and Professor of Chemistry

Target Audience: Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators
Topic: Recruitment, Retention, and Marketing Strategies

Over a three-year period, Hendrix-Noyce STEM Teacher Education in the Arkansas Delta (Hendrix N-STEAD) has examined how to effectively enhance and market an undergraduate teacher licensure program to facilitate the recruitment of the College’s science and mathematics majors to become highly-qualified STEM teachers in high-need school districts. The scholar program provided partial to tuition free scholarship opportunities to students in exchange for their commitment to teach in high-need school districts. The internship provided a stipend for freshman and sophomore students to explore STEM teaching through a six-week summer internship that allowed them to engage in the planning, teaching, and assessment of STEM content for a summer science camp. Activities used to market the program and recruit students included interest meetings, field experiences in high-need settings, campus fairs, visiting science and mathematics department meetings, class visits, a mission trip and mass marketing efforts, such as mailings and flyers.
The STEM teacher rate of recruitment for three years of the study was 33%, as compared to 13% three years prior to the study and 5% 10 years prior. Additionally, 3 of 9 interns (33%) indicated an interest in teaching. The findings from the evaluation of this program provide programmatic elements that fostered the enhancement and growth of an undergraduate teacher licensure program.

**Session 2.12a: 10:15am-10:45am**

**2.12a Marketing Your Noyce Program Online: A Study of 113 Noyce Websites**

*Length of Session: 30 minutes*

Gregory Phelan, State University of New York College at Cortland, gregory.phelan@cortland.edu, PI

**Target Audience:** Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff  
**Topic:** Recruitment, Retention, and Marketing Strategies

A study of 113 Noyce websites was conducted to determine what information could be found on these sites and how they connected to the mission of the Robert Noyce Project. A framework to evaluate the content present on each site was developed. A total of 98 active, original sites were found with 6 no longer being active, 6 being duplicates and three requiring username/password credentials. This workshop will examine what common themes were found on these websites and what types of information is most commonly present. Information about best practices and examples of exceptional websites will be discussed. The frameworks used, the conceptual model development and data collection process will also be discussed.

**Session 2.12b: 10:45am-11:15am**

**2.12b Recruiting the Best and the Brightest: Recruitment Activities to Reach Underrepresented STEM Scholars**

*Length of Session: 30 minutes*

Noemi Rodriguez, CSU Dominguez Hills, norodriguez@csudh.edu, STEM Undergraduate Program Manager

**Target Audience:** Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators  
**Topic:** Recruitment, Retention, and Marketing Strategies

This workshop will feature successful recruitment, retention and marketing strategies utilized by the Noyce Scholars Program at California State University Dominguez Hills, which was established in 2008. Attendees will be shown a unique comprehensive teacher preparation pipeline from undergraduate to teacher credential completion, recruitment materials, and overview of retention activities. This workshop will also include a panel presentation from current and past Noyce Scholars.

**Session 2.13a: 10:15am-10:45am**

**2.13a Designing a Dynamic Mentoring Network from EPP to Novice Teaching**

*Length of Session: 30 minutes*

Chrsissy Cross, Stephen F. Austin State University, crossc1@sfasu.edu, Co-PI  
Lesa Beverly, PI  
Keith Hubbard, Co-PI, Project Director  
Dennis Gravatt, Co-PI

**Target Audience:** Evaluators/Education Researchers, Higher Education Institution Administrators, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators  
**Topic:** Supporting New Teachers

The Noyce Scholarship program is designed to support future STEM teachers in their undergraduate experience and continue after they graduate as novice teachers. Transitioning from an undergraduate pre-service teacher to a novice teacher is often a difficult and jarring progression for many students. This difficult transition is a prime opportunity for the Noyce Scholarship grant staff to provide unique resources, professional support, and emotional support. While there is plenty of research indicating the efficacy of mentoring networks in higher education (Sorcinelli & Yun, 2007), and for novice teachers (Ingersoll & Strong, 2011) there is little research about designing mentoring networks for undergraduate pre-service teachers before their semester of student teaching. The dynamic mentoring network at Stephen F. Austin State University for the Noyce Program has some distinct attributes that allow it to move and change with the Noyce Scholar to meet the needs of the scholar whatever role they are in at that moment, undergrad, student teacher or novice teacher. Three types of mentoring are evident in the Noyce Scholarship Mentoring Network, traditional formal mentoring by an experienced STEM teacher, sponsorship by STEM and education faculty (Hewlett, 2013), and intra-cohort peer mentoring. This unique and specialized dynamic mentoring network has been effective method of mentoring.
for ALL Noyce Scholars and graduates form Stephen F. Austin State University.

**Session 2.13b: 10:45am-11:15am**

**2.13b What’s the Hook? Robert NOYCE Summer Interns Discuss their Experiences Engaging K-12 Learners in STE**

*Length of Session: 30 minutes*

Rachel Davis-Haley, Xavier University of Louisiana, rdaVisha@xula.edu, PI

Target Audience: Project PIs, Co-PIs, Other Faculty/Staff, Undergraduate and/or Graduate Noyce Scholars

Topic: Supporting New Teachers

This investigation documents the challenges and success that Robert Noyce summer interns faced engaging K-12 learners in structured science and mathematics learning experiences during a pre-collegiate summer program. We offer suggestions for recruiting and mentoring underrepresented STEM educators. Given the challenges of recruiting and retaining qualified STEM educators, this investigation highlights the importance of mentoring and collaboration for the successful retention of African-American STEM educators. This investigation answers the following question: What happens when Robert NOYCE STEM undergraduate interns engage k-12 learners in structured STEM activities?

Methods/Data Sources: Qualitative research methods are being used to collect data. Data for this investigation consists of: interview transcripts and survey responses. Data has been collected, transcribed, coded and analyzed for related themes, categories, assertions and patterns. The findings will be validated through triangulation of data, member checks and comparing the findings with existing theories (Maxwell, 2012). This process of interpretation, critique and reanalysis will become a hermeneutic cycle that results in the emergence of several constructions of one possible view of the experiences of these interns.

Results and/or recommendations: Preliminary results reveal that interns believed they were most successful when they students engaged in hands-on activities. Interns also revealed that collaborating with more experienced teachers was important. This investigation has numerous implications for recruiting, retaining and mentoring underrepresented STEM educators, student learning and teaching methodology.

**Session 2.14a: 10:15am-10:45am**

**2.14a Lived Experiences of Preservice Teachers Who Choose Teaching as a Second Career**

*Length of Session: 30 minutes*

Sheila Vaidya, Drexel University, vaidyasr@drexel.edu, Professor

Don McEachron, School of Biomedical Engineering and Health Systems, Co-PI

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Non-Profit Organization Personnel, Noyce Master Teachers, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Teacher Leadership

This workshop is based on a follow-up inquiry with 34 pre-service teachers who are career changers. We examine their beliefs, attitudes and their lived experiences as they enter teaching and work to develop a teacher identity. We present teacher profiles and show how their previous careers serve as a powerful asset in their teaching profession. We provide evidence to argue for a stronger emphasis on recruitment of career changers, especially in the teaching of STEM subjects.

**Session 2.14b: 10:45am-11:15am**

**2.14b Promoting STEM Starts with You: Ten Strategies to Increase Underrepresented Minorities in STEM**

*Length of Session: 30 minutes*

Karen Bowers, University California, San Diego, kbowers@guhsd.net, Noyce Master Teacher, Grossmont Union High School District NGSS Support Provider

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Non-Profit Organization Personnel, Noyce Master Teachers, Noyce Teaching Fellows, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars

Topic: Teaching a Diverse Student Population

Explore practical steps that will engage underrepresented minority students from day one. Then keep learners involved with a myriad of resources that has them ‘doing’ cutting-edge science, technology, engineering and mathematics rather than just ‘learning about’ settled science and obsolete inventions. Finally, help high school students solidify their STEM degrees as they chose, apply to and get financial aid for the college of
their choice. Walk away with concrete strategies to apply immediately. You can make a difference in a young person's life but you need to take that first step. Use these shared strategies to empower youth to solve tomorrow's problems with skills they learn today.

Session 2.15a: 10:15am-10:45am

2.15a Research Experience as a Component of Teacher Preparation

Length of Session: 30 minutes

John Keller, Cal Poly San Luis Obispo, jmkeller@calpoly.edu, Director, STEM Teacher and Researcher (STAR) Program
Jessica Krim, jkrim@siue.edu, Southern Illinois University Edwardsville, Noyce PI

Target Audience: Evaluators/Education Researchers, Project PIs, Co-Pis, Other Faculty/Staff, Undergraduate and/or Graduate Noyce Scholars
Topic: Innovative Noyce Program Practices and Teacher Preparation Models (Including new courses and degree requirement and early field experiences)

We will present models for engaging Noyce Scholars in authentic research experiences as a component of teacher preparation. We will describe the STEM Teacher and Researcher (STAR) Program, which has provided summer research opportunities at national laboratories for over 200 Noyce Scholars since 2010. We will also discuss the Collaborative Around Research Experiences for Teachers (CARET), a consortium of over 10 institutions exploring use of undergraduate research experiences (UREs), course undergraduate research experiences (CUREs), and teacher research experiences (TREs) to enhance teacher preparation.

Session 2.15b: 10:45am-11:15am

2.15b Starting from Scratch: One Program's Experience with Building New School Partnerships

Length of Session: 30 minutes

Stephanie Fanselow, University of Northern Colorado, stephanie.fanselow@unco.edu, Assistant Professor

Target Audience: Higher Education Institution Administrators, Noyce Master Teachers, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators
Topic: Partnerships with High-Need Schools and Districts

The creation of a new collaborative teacher preparation program between two universities, Colorado School of Mines (Mines) and the University of Northern Colorado (UNC), required establishing new partnerships with local schools near Mines. The Teacher Education Alliance, Mines-UNC Partnership (TEAM-UP) is a new collaborative approach to preparing STEM teachers. Mines is a premier science and engineering institution located on the western edge of Denver, Colorado. UNC specializes in teacher preparation but is located 60 miles north and east of Mines. TEAM-UP provides a pathway for STEM students at Mines to become licensed to teach secondary science and/or mathematics through UNC. Although UNC has long-standing partnerships with many excellent schools in northern Colorado, TEAM-UP required new school partnerships in the Denver area. In this workshop, I will share my experiences over the past year with establishing strong, collaborative partnerships with high needs schools where none previously existed. Communication has been essential along with a large dose of humility. Come and share your own experiences with establishing new school partnerships. Let's learn from each other!