2016 NOYCE SUMMIT
Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools
Open Minds

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2016 Noyce Summit

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

July 20-22, 2016
Renaissance Washington DC Hotel

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)
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Noyce Summit Overview

The theme of the 2016 Robert Noyce Teacher Scholarship Program Summit is *Stimulating Research and Innovation for STEM Preservice Teacher Preparation in High-Need Schools.*

The 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 this 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.
The 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://nsf.gov/funding/pgm_summ.jsp?pims_id=5733&org=EHR&from=home
The 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/.
The 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, SRI International
Jeanne Century, University of Chicago
Scott Jackson Dantley, Accreditation and Education Consultant
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:
Yolanda S. George, AAAS
Shirley M. Malcom, AAAS
AGENDA

WEDNESDAY, JULY 20, 2016

3:30 pm - 9:00 pm Registration  
(Grand Registration)

3:00 pm - 6:30 pm Poster Setup  
(Renaissance Ballroom)

3:00 pm - 5:00 pm Museum Tours for Scholars and Fellows: Tour Group 1 (optional)  
(Meet at Grand Registration)

3:00 pm - 5:00 pm New Awardees Session with National Science Foundation (NSF) Staff  
(Mount Vernon Square)

5:00 pm - 6:30 pm Plenary Session 1  
(Grand Ballroom)

Welcome and Overview of the Summit and AAAS Initiative

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

Welcome and Presentation:

Susan Rundell Singer, Division Director, Division of Undergraduate Education (DUE), NSF

Announcements

6:30 pm - 8:00 pm Poster Session 1 and Networking Reception  
(Renaissance Ballroom and Foyer)

THURSDAY, JULY 21, 2016

7:00 am - 6:00 pm Registration  
(Grand Registration)

7:00 am - 2:00 pm Poster Setup  
(Renaissance Ballroom)

7:45 am - 9:15 am Plenary Session 2 and Networking Breakfast  
(Grand Ballroom)

Welcome and Moderator:

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

Speakers:

Jose Blackorby, Senior Director of Research and Development, CAST

Roni Ellington, Associate Professor, Mathematics Education, Morgan State 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  
(Grand Ballroom)

Welcome and Moderator:

Sandra Richardson, Program Director and Co-lead, Robert Noyce Teacher Scholarship Program, DUE, NSF

Voices from the Field Panelists:

Francisco Colón, Shortridge High School, Indianapolis, IN

Kyle Lauchmen, Adams City High School, Commerce City, CO

Sunshine Roque, Lincoln High School, San Francisco, CA

Camille Ulibarri, Pojoaque Valley Middle School, Santa Fe, NM

Jessica White, Richmond City Public Schools, Richmond, VA

Ben Woodford, Central Coast New Tech High School, Nipomo, CA

12:00 pm - 12:15 pm Break
### AGENDA

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| 12:15 pm - 1:45 pm | Plenary Session 4 and Working Lunch  
(Grand Ballroom) |
| Moderator:    | Shirley M. Malcom, Director, Education and Human Resources Programs, AAAS |
| Welcome:      | Rush D. Holt, Chief Executive Officer, AAAS and Executive Publisher, Science Family of Journals |
| Speaker:      | Richard M. Ingersoll, Board of Overseers Professor of Education and Sociology, University of Pennsylvania |
| 1:45 pm - 2:00 pm | Break |
| 2:00 pm - 3:30 pm | Poster Session 2  
(Renaissance Ballroom) |
| 3:30 pm - 4:00 pm | Remove Posters  
Break |
| 4:00 pm - 6:00 pm | Mini-Plenary Sessions and Discussion Groups: Session 1  
(Grand Ballroom) |
| Identifying a Research Agenda for Preservice Education of STEM Teachers in High-Need Schools – Introduction and Discussion Group Session 1 |
| Speakers:     | Yolanda S. George, Deputy Director, Education and Human Resources Programs, AAAS |
|               | Kathleen Bergin, Program Director Lead, Robert Noyce Teacher Scholarship Program, DUE, NSF |
| 6:00 pm       | Dinner On Your Own |

### FRIDAY, JULY 22, 2016

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<td>7:00 am - 8:00 am</td>
<td>Networking Session 2 and Continental Breakfast</td>
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| 8:00 am - 10:00 am | Mini-Plenary Sessions and Discussion Groups: Session 2  
Identifying a Research Agenda for Preservice Education of STEM Teachers in High-Need Schools – Discussion Group Session 2  
(See handout for topics, discussion leader(s), and 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  
(Grand Ballroom) |
| Welcome and Presentation: | Shirley M. Malcom, Director, Education and Human Resources Programs, AAAS |
| Speaker:      | W. James “Jim” Lewis, Deputy Assistant Director for the Directorate for Education and Human Resources, NSF |
| Evaluation    | 12:30 pm Summit Adjourns |
| 12:30 pm      | Museum Tours for Scholars and Fellows: Tour Group 2 (optional)  
(Meet at Grand Registration) |
Kathleen Bergin, Program Director, Division of Undergraduate Education, Directorate for Education and Human Resources, NSF

Kathleen Bergin is a Program Director in the Division of Undergraduate Education in the Directorate for Education and Human Resources at the National Science Foundation. She 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.

Jose Blackorby, Senior Director of Research and Development, CAST

Jose Blackorby is Senior Director of Research and Development at CAST, a nonprofit education research and development organization that works to expand learning opportunities for all individuals through Universal Design for Learning. He was the Co-Director, Center for Learning and Development at SRI. He has more than 20 years of experience in the design and implementation of large-scale, multifaceted studies with research, policy, and practice implications. He has authored or coauthored reports and journal articles that have provided important information for the development of state and federal policy regarding special education, education reform and innovation, charter schools, and human services coordination.

Blackorby has extensive experience leading national studies on students with disabilities, including a national study of states’ progress in implementing alternate assessment systems for students with significant cognitive disabilities and another on the implementation of the Individuals with Disabilities Education Act (IDEA).

Blackorby was co-director of the Special Education Elementary Longitudinal Study from 1998 to 2007 and is on the research team for the National Longitudinal Transition Study-2. Both of these studies provide national population estimates for many of the key questions related to programs and outcomes that face students who receive special education services. A key contribution to these studies was his design and oversight of the direct assessments of students’ abilities in reading and mathematics and, for secondary school students, content knowledge in science and social studies. These assessments represent the first assessment data ever collected on the entire range of students with disabilities at the national level. In addition to large-scale research in special education, Blackorby has considerable experience in projects related to emerging trends in education reform and innovation generally, as well as their potential for students with disabilities. He has a diverse range of research and development interests, including students with mild disabilities; reading, math, and science achievement; assistive technology; secondary school programs and transition; assessment and curriculum design; and universal design for learning.

Blackorby serves in an advisory role on national panels for government initiatives, as well as private organizations. Blackorby holds a PhD in special education from the University of Washington.
Roni Ellington, Associate Professor, Mathematics Education, Morgan State University

Roni Ellington is an Associate Professor, Mathematics Education and Coordinator of Graduate Programs in Mathematics and Science Education in the School of Education and Urban Studies at Morgan State University. She was appointed to the Morgan faculty as Assistant Professor in 2006 with a specialty in Mathematics Education. Previously, she served as a lecturer in the Department of Mathematics.

Ellington has presented her research findings at a variety of local and national conferences including the American Educational Research Association (AERA) national conference, the National Council of Teachers of Mathematics (NCTM) national conference, the University of Maryland Mathematics Education Research Consortium, and the National Council of Teachers of Mathematics regional conference. Her research interests include understanding the experiences of high achieving mathematics students, STEM education, mathematics curriculum, instruction, and teacher professional development.

She teaches a variety of courses in mathematics and science education including mathematics curriculum, concept development in mathematics education, research seminar courses, and mathematics in the high school curriculum. She received her PhD in Mathematics Education from the University of Maryland College Park.

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’Oréal 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.

Rush D. Holt, Chief Executive Officer, AAAS and Executive Publisher, Science Family of Journals

Rush D. Holt, PhD, became the 18th 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 society.

Over his long career, Holt has held positions as a teacher, scientist, administrator, and policymaker. From 1987 to 1998, Holt was assistant director of the Princeton Plasma Physics Laboratory (PPPL), a Department of Energy national lab, which is the largest research facility of Princeton University and one of the largest alternative energy research facilities in the country. At PPPL, Holt helped establish the lab’s nationally renowned science education program. From 1980 to 1988, Holt served on the faculty of Swarthmore College, where he taught courses in physics and public policy. In 1982, he took leave from Swarthmore to serve as an AAAS/American Physical Society
Science and Technology Policy Fellow on Capitol Hill. The Fellowships program, dating to 1973, places outstanding scientists and engineers in executive, legislative, and Congressional branch assignments for one or two years; by early 2015, the program had served nearly 3,000 alumni working worldwide in the policy, academic, industry, and nonprofit realms. Holt has said that his AAAS S&T Policy Fellowship was “life changing,” and served as a springboard to his role in Congress. 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. In 1981, Holt was issued a patent for an improved solar-pond technology for harnessing energy from sunlight.

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. In Congress, Holt served as a senior member of the Committee on Natural Resources and the Committee on Education and the Workforce. On Capitol Hill, Holt established a long track record of advocacy for federal investment in research and development, science education, and innovation. He served on the National Commission on the Teaching of Mathematics and Science (known as the Glenn Commission), founded the Congressional Research and Development Caucus, and served as a co-chair of the Biomedical Research Caucus. Holt served eight years on the Permanent Select Committee on Intelligence and, from 2007 to 2010, chaired the Select Intelligence Oversight Panel, which worked to strengthen legislative oversight of the intelligence community. His legislative work earned him numerous accolades, including being named one of Scientific American magazine’s “50 National Visionaries Contributing to a Brighter Technological Future” and a “Champion of Science” by the Science Coalition. He has also received awards from the American Chemical Society, the American Association of University Professors, the National Association of Graduate-Professional Students, the American Institute for Medical and Biological Engineering, the Council of Scientific Society Presidents, the American Geophysical Union, and the Biotechnology Industry Organization. Holt is also a past recipient of two of AAAS’ highest honors: the William D. Carey Lectureship Award (2005) and the Philip Hauge Abelson Award (2010).

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, MN, and he holds MA and PhD degrees in physics from New York University. He is an elected fellow of AAAS, the American Physical Society, and Sigma Xi, and he holds honorary degrees from Monmouth University, Rider University, and Thomas Edison State College. He is married to Margaret Lancefield, a physician, and they have three children and seven grandchildren.

Richard M. Ingersoll, Board of Overseers Professor of Education and Sociology, University of Pennsylvania

After teaching in both public and private schools for a number of years, Ingersoll obtained a PhD in sociology from the University of Pennsylvania in 1992. Currently he is the Board of Overseers Professor of Education and Sociology at the University of Pennsylvania.

Ingersoll’s research is concerned with the character of elementary and secondary schools as workplaces, teachers as employees and teaching as a job. He has published over 100 articles, reports, chapters, and essays on topics such as: the management and organization of schools; accountability and control in schools; teacher supply, demand, shortages and turnover; induction and mentoring for beginning teachers; the problem of underqualified teachers; the status of teaching as a profession; and changes in the demographic character of the teaching force. His research on these issues has been widely reported in the media and featured in numerous major education reports.

Ingersoll has received a number of awards, including: the Richard B. Russell Award for Excellence in Teaching from the University of Georgia in 1999; the Harry Braverman Award from the Society for the Study of Social Problems for his work on organizational control and accountability in schools in 1992; an American Educational Research Association Fellowship; the National Award of Distinction from the Penn Education Alumni Association in 2004; the Outstanding Writing Award from the American Association of Colleges for Teacher Education for his book, Who Controls Teachers’ Work? Power and Accountability in America’s Schools, published by Harvard University Press in 2003. He was elected as a Fellow of the American Educational Research Association in 2009. He was selected as Outstanding Researcher in 2012 by the Association of Teacher Educators, received the Lifetime Achievement Award in 2015 from the Organizational Theory Special Interest Group of the American Educational Research Association, and was selected as the recipient of the Teacher-Powered Schools Initiative Advancements in Research Award in 2015 by Education Evolving -- a national organization devoted to reforming and redesigning public schools.

Ingersoll’s research is nationally recognized, was cited by President Clinton in a number of speeches announcing his teacher recruitment and training initiatives, influenced the No Child Left Behind Act, and has been featured in numerous major education reports, including those published by the National Commission on Teaching and America’s Future, the Education Trust, the Alliance for Excellence in Education, the National Governors’ Association, the international Organization for
Economic Co-operation and Development, and President Obama’s Council of Advisors on Science and Technology. From 2005 to 2007, Professor Ingersoll served on a National Academy of Sciences/National Research Council Committee evaluating National Board teacher certification.

Jim Lewis, Deputy Assistant Director, Education and Human Resources Directorate, NSF

W. James “Jim” Lewis is the Aaron Douglas professor of mathematics and Director of the Center for Science, Mathematics, and Computer Education at the University of Nebraska-Lincoln. A Fellow of the American Mathematical Society, Lewis was chair of the writing team that produced the CBMS report, *The Mathematical Education of Teachers II*, co-chair of the National Research Council’s committee that produced *Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium*, and a member of the NRC committee that produced *Preparing Teachers: Building Evidence for Sound Policy*. He was a member of the American Mathematical Society’s Task Force that produced *Towards Excellence: Leading a Doctoral Mathematics Department in the 21st Century* and author of the book’s first four chapters.

For the past 15 years, he has worked to improve the mathematical education of teachers in Nebraska with the support of three major grants from the NSF, Math in the Middle Institute Partnership, NebraskaMATH and NebraskaNOYCE. Currently he is on leave from Nebraska at the National Science Foundation where he is serving as the Deputy Assistant Director for the Directorate for Education and Human Resources. He received his PhD in mathematics from Louisiana State University.

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

Shirley M. Malcom, Director for 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 16 honorary degrees.

Malcom serves on several boards, including the Heinz Endowments, Public Agenda, Digital Promise, and the National Mathe- matics 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 Science, the highest award granted 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.

Sandra Richardson, Program Director and Co-lead, Robert Noyce Teacher Scholarship Program, DUE, NSF

Sandra Richardson is a Program Director and co-lead of the Robert Noyce Teacher Scholarship Program at the National Science Foundation (NSF) in the Directorate of Education and Human Resources, Division of Undergraduate Education. Her research publications and scholarly interests include developing effective tools for mathematics curricula, advancing pedagogical content knowledge of mathematics teachers, and studying minority and underrepresented students’ mathematical thinking at all levels of school mathematics. She has been the principal investigator and co-principal investigator on public and private grants totaling over $3 million dollars. She holds a BS in Mathematics (Dillard University) and a MS and PhD in Mathematics Education (Purdue University).

Susan Singer, Division Director, Division of Undergraduate Education, NSF

Susan Rundell Singer is Division Director in the Division of Undergraduate Education at NSF and Laurence McKinley Gould Professor, in the Biology and Cognitive Science Departments at Carleton. She pursues a career that integrates science and education. In addition to a PhD in biology from Rensselaer Polytechnic Institute, she completed a teacher certification program in New York State. She is a developmental biologist who studies flowering in legumes and also does research on learning in genomics.

Singer is a AAAS fellow and received both the American Society of Plant Biology teaching award and Botanical Society of America Charles Bessey teaching award. She directed Carleton’s Perlman Center for Learning and Teaching, was an NSF program officer in Biology, and is a co-author of the Vision and Change in Undergraduate Biology report and an introductory biology text. She has served on numerous boards, including the NSF EHR advisory committee, Biological Sciences Curriculum Study Board,
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).
Session 1: Thursday, July 21, 2016
9:30am - 10:45am

1.1 The Mathematics Behind Games

Length of Session: 75 minutes

Jeremy Akin, CSU San Bernardino, jaikin@csusb.edu, Director, Center for Enhancement of Mathematics Education
Stephanie Molina, stephanie.molina@sbcusd.k12.ca.us, CSU San Bernardino Noyce Scholar

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: Resources for Teachers

In this workshop, we will investigate the mathematics behind several very accessible (and fun) games. The games we will consider seem on the surface to be unrelated, but there is a mathematical commonality within the patterns used to create the games that tie them together and suggest many interesting mathematical questions. We will spend time playing the games, and as we become more familiar with the games, questions will emerge. Ultimately, we hope to zero in on the mathematical structures lurking beneath the surface that make it possible to create the games. If time permits, we will attempt to create our own game, based on the mathematics we learned.

1.2 Engineering Design - Generating and Selecting Alternate Design Solutions

Length of Session: 75 minutes

Darius Hines, Claremont Graduate University, dariushines@gmail.com, Master Teacher

Target Audience: Non-Profit Organization Personnel, Noyce Master Teachers, Noyce Teaching Fellows, School and District Administrators
Topic: Resources for Teachers

Part of the NGSS requires students to perform engineering design. Many instructors are not familiar with the processes of engineering design. They are unaware there are specific techniques to generate alternate designs for various problems. The 75 minute workshop I propose will demonstrate how to generate several design solutions for a problem and then select a design to develop. The attendees will be tasked with designing a slow flying airplane; a paper airplane that will cover the most distance in the longest amount of time. The process will begin with introducing design parameters known as objectives, constraints and functions. The attendees will then identify these parameters for this specific project. They will then be provided background materials and websites to briefly research paper airplane construction techniques. Next, the attendees will be introduced to techniques to identify means to accomplish functions. They will then develop means for their project. Attendees will then learn how to use means to develop several designs and then do so with their project. Finally, the attendees will construct and test their designs.

The attendees will take-away from this workshop several specific techniques for accomplishing these tasks. They will obtain graphics, notes and personal experience. Attendees will also have access to other materials I have generated on these topics.

1.3 Inclusive STEM Pedagogies

Length of Session: 75 minutes

Janelle Johnson, Metropolitan State University of Denver, jjohn428@msudenver.edu, Assistant Professor, STEM Teaching & Learning

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: Teaching a Diverse Student Population

This hands-on workshop focuses on the ways facilitators can address disparities and improve learning outcomes for participants in both formal and informal STEM settings. Workshop contents were developed during the 1) Increasing Marginalized Girls’ Access to STEM initiative of the NSF-funded National Girls’ Collaborative in partnership with the Georgetown Center on Poverty and Inequality, the White House Domestic Policy Council and Council on Women and Girls, and the U.S. Department of Education; and 2) NSF-funded weeklong STEM equity boot camps for Global Learning and Observations to Benefit the Environment (GLOBE) to broaden participation in the sciences among underrepresented groups. Participants learn how to better serve traditionally underserved and underrepresented populations in the STEM disciplines, including women, minorities, and persons with disabilities.
1.4 Innovative Methods for Supporting the Mathematics and Pedagogy of New Teachers

*Length of Session: 75 minutes*

James Matthews, Siena College, matthews@siena.edu, Professor, Noyce 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: Resources for 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. Mathematics classrooms should be problem-solving centers. Students should be provided with tasks that require them to do more than follow an algorithm. Problems may involve figuring something out, computing, modeling, proving, making an argument, finding examples, finding counter-examples, organizing, classifying and more. In all math classrooms, there should be problems of the day, of the week, and of the quarter. We will share how to successfully accomplish the goal of creating a problem-solving centered classroom. In this session we will focus on posing, motivating, and implementing problems of the week. Workshop participants will work on some problems and see how a problem based curriculum satisfies the most important learning standards in mathematics. 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 What’s The Odds: Probability in Middle School

*Length of Session: 75 minutes*

Johnny Reyes, Pomona Unified School District, Noyce Master Teacher Fellow’s Program, johnny.reyes@pusd.org, Master Teacher Fellow/Speaker

Enriqueta Ramirez, enriqueta.ramirez@pusd.org, Noyce MTF/Speaker

Mary Campbell, mary.campbell@pusd.org, Noyce MTF/Speaker

Michelle Allen, michelle.allen@pusd.org, Noyce MTF/Speaker

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows

Topic: Teaching a Diverse Student Population

The first in a series of five lessons on Probability. The main learning goal is for students to get an intuitive feel for defining outcomes, finding the probability of an event as well as to determine the outcomes and probabilities of experiments. Inquiry based instruction and interaction by way of die rolls and spinners to help predict the outcome of experiments are imbedded in the lesson. Recognizing the difference between outcomes that are equally likely and equally not likely to occur will be drawn from our activities. Probability concepts will complete our series in the form of practice exercises, challenge exercises and solutions.

1.6 Grant Proposal Writing for STEM Teachers

*Length of Session: 75 minutes*

Deidre Sessoms, California State University, Sacramento, sessoms@csus.edu, Professor

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

Topic: Resources for Teachers

Grant proposal writing can be simple and quick if a few key principles are applied. Explore opportunities for grades K-12 STEM teachers to find financial support for NGSS-aligned Project-Based Learning in STEM classrooms. A list of K-12 grant funding opportunities will be distributed, along with tips for successful proposals. Attendees will have time to search for applicable grant funding sources using provided links (bring your electronic devices!) and begin their ‘plan to succeed’ in proposal writing. A school-wide aquaponics project will be used as an example of how to build community and school support and find funding.

1.7 Geometry Transformations and the Common Core

*Length of Session: 75 minutes*

Jade White, High Tech High, jade.mohr.white@gmail.com, Teacher

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

Topic: Resources for Teachers

In this workshop, you will dive into geometry transformations as outlined in the CCSS. The focus of this workshop will be on modeling and working through geometry transformation examples that can be used in the middle and high school classroom. We will explore how to build your geometry units based on transformations and will look at the connections that exist across grade levels. The focus of this workshop will be on
paper & pencil examples and how to use geometry tools (compass, straight edge, protractor and patty paper) to enhance the geometry experience in the classroom.

1.8 Making Science Accessible: Building Academic Language through Science Podcasts

Length of Session: 60 minutes

Neporcha Cone, Kennesaw State University, ncone@kennesaw.edu, Co-PI
Brendan Callahan, Kennesaw State University, bcallah7@kennesaw.edu, PI

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

Topic: Resources for Teachers

Many teacher candidates feel prepared and excited to teach science, but less prepared and enthusiastic about teaching the academic language necessary for scientific discourse. This workshop session will discuss the value of using personal science stories to engage students in the academic language (e.g., vocabulary and discourse) of science. Workshop participants will deconstruct previously developed science podcasts and will create their own science podcasts using personal experiences or the ‘real-life’ experiences of their students, as well as the relationship between academic and everyday language. Through these activities, participants will reflect on how they can use science podcasts as a vehicle for fostering a learning community and making science relevant to students’ lived experiences.

1.9 Melting the "Neutrality" of Math: Learning to Teach Math and Social Justice in the Field

Length of Session: 60 minutes

Lisa Edstrom, Barnard College, elisa@barnard.edu, Instructor, Co-PI
Ishrat Ahmed, Barnard College, ia2267@barnard.edu, Student
Maria Rivera Maulucci, Barnard College, mriveram@barnard.edu, Associate Professor, Director, Chair of Barnard Education Program

Target Audience: Evaluators/Education Researchers, Project Pls, 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)

This workshop will introduce participants to a unique model for math methods that brings in-service and pre-service teachers together, both in the college classroom and in the field, to think about how to make math instruction more meaningful for students. In the course Math And The City, Barnard students and New York City teachers are introduced to teaching math through a social justice lens while learning how to use New York City as a resource for teaching. In this workshop, participants will have the opportunity to learn about the course, while exploring ways in which the local environment can be used as a resource. In a hands-on exercise, participants will use Washington D.C., focusing on the Smithsonian as a local institution that can enhance mathematical learning for students, as they learn how to adapt the Math And The City model to other locations. In addition, one of our Noyce Scholars will engage participants in mathematical activities as she presents how she developed lesson plans with a social justice lens. Participants will learn how she melted the ‘neutrality’ of math.

1.10 Defining STEM Teaching Practices: Progress and Challenges in Teacher Preparation

Length of Session: 60 minutes

Delacy Ganley, Claremont Graduate University, delacy.ganley@cgu.edu, Co-Principal Investigator, CCSI Project Clinical Associate Professor of Education Claremont Graduate University
Eddie Partida, Claremont Graduate University, CCSI Project Coordinator, Doctoral Student

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Noyce Master Teachers, Project Pls, Co-PIs, Other Faculty/Staff

Topic: Supporting New Teachers

What is a STEM Educator and what distinguishes a STEM Educator from a traditional science or math teacher? In this workshop we will share the progress of an NSF funded project aimed at developing a framework of STEM Teaching Practices that we hope can advance how math and science teachers are prepared in California. Over the last year and a half, Claremont Graduate University has partnered with STEM Faculty from the Claremont Colleges to create a series of STEM courses designed to provide math and science teachers with authentic experiences in STEM. The courses have served as a platform for both defining what it means to be a STEM Educator and for developing of core set of STEM teaching practices that all STEM educators should master. This workshop will first introduce the participants to the framework, background and context. Participants will then watch and discuss short video clips highlighting examples/non-examples of teacher’s STEM Teaching Practices. The presentation will conclude with sharing of findings from a pilot study on the STEM Teaching Practices of novice teachers in a summer STEM enrichment program. The workshop will conclude with a Q/A.
1.11 Induction Workshops, In-School Mentoring, and Pre-Service Seminar: Elements for Novice Teacher Success

Length of Session: 60 minutes

Doris Kimbrough, University of Colorado Denver, doris.kimbrough@ucdenver.edu, Professor of Chemistry, Noyce PI

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Noyce Master Teachers, Noyce Teaching Fellows, 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)

The CU Denver science Noyce program implemented three components that we have identified as elements that promote success in the novice teacher. These three components were created to fill identified gaps in our traditional teacher preparation and induction process: STEM-focused induction workshops, in-school mentorship for student teaching, and a weekly seminar for Noyce scholars. An interactive “Journey Wall” using artifacts from each component will be created by workshop participants, culminating in a gallery walk. Participants will have the opportunity to add information from their own projects to identify ways that these elements can be incorporated into their programs.

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

Session 1:12a: 9:30am - 10:00am

1.12a Preparing Noyce Scholars as Teacher-Researchers through Summer Research at National Labs

Length of Session: 30 minutes

John Keller, Cal Poly SLO, jmkeller@calpoly.edu, Executive Director, STEM Teacher and Researcher (STAR) Program
STAR Alumni attending 2016 Noyce Summit

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)

STAR - the STEM Teacher and Researcher Program - provides paid summer research opportunities at national laboratory facilities for Noyce Scholars from across the nation as an innovative teacher preparation model focused on the development of “teacher-researchers.” Over the past decade, the program has coordinated over 550 summer research opportunities for roughly 425 aspiring teachers from more than 80 Noyce campuses in 30 states. Over half of these research opportunities have involved Noyce Scholars. During this 30-minute workshop, Noyce Scholars who participated in the STAR Program prior to 2016 will describe how their immersive summer research experiences strengthened their abilities to engage their students in scientific, engineering, and mathematical practices. We will also present data from ongoing longitudinal research into the impacts of the STAR Program on teacher recruitment and retention, classroom practices, teacher leadership, and professional networking. For information about the STAR Program, visit www.StarTeacherResearcher.org. (This material is based upon work supported by the National Science Foundation under Grant Nos. 0952013 and 1340110. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.)

Session 1.12b: 10:15am - 10:45am

1.12b Noyce Internship Institute at the University of Houston: Professional Development for Noyce Interns

Length of Session: 30 minutes

Donna Stokes, University of Houston, dwstokes@central.uh.edu, PI, Associate Professor, Undergraduate Chair, Department of Physics
Paige Evans, pevans@uh.edu, Co-PI, Clinical Associate Professor
Simon Bott, sbott@uh.edu, Co-PI, Instructional Professor

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, 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)

The Robert Noyce Scholarship and Internship Program at the University of Houston developed and implemented an eight-day Professional Development Institute to prepare Noyce Interns to serve as camp counselors and teaching assistants in a summer STEM camp for under-served middle school students. This session will highlight the structure and content of the Professional Development Institute which includes the follow-
We use care theory (Noddings, 2012, 2005) to frame our systemic support of both pre-service and in-service secondary math teachers. The PI and Co-PIs of the project go out of their way to ensure each scholar has good experiences in the program. Having established close relationships with them as pre-service teachers provides them a strong support network as they move into their induction years as teachers. Case situations will be shared.

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

1.13a Strengthening the Vision: Examining the Internalization of a Framework for Teacher Leadership

Length of Session: 30 minutes

Gregory Rushton, Stony Brook University, gregory.rushton@stonybrook.edu, Associate Professor
Brett Criswell, University of Kentucky

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

STEM teacher leadership represents the intersection of two important educational foci in the U.S.: STEM education and teacher leadership. This presentation will summarize current studies that explore a conceptual framework for STEM teacher leadership both theoretically and empirically. Within that set we will describe how the conceptual framework has evolved, as well as what we have learned about the impact of that framework on the teacher and leadership development of a group of 32 teaching fellows (TFs) and master teaching fellows (MTFs) in the Noyce-funded I-IMPACT project. In this session we will describe the development of the framework and initial insights concerning the internalization of key principles from it by the MTFs.

Session 1:13b: 10:15am - 10:45am

1.13b Care as an Approach to Supporting Nontraditional Secondary Mathematics Teachers

Length of Session: 30 minutes

Jacqueline Sack, University of Houston Downtown, sackj@uhd.edu, Co-PI, Associate Professor

Target Audience: Noyce Master Teachers, Project PIs, Co-Pis, Other Faculty/Staff
Topic: Supporting New Teachers

Session 1:14a: 9:30am - 10:00am

1.14a TEACH/Here: Providing Induction Support for Beginning Teachers

Length of Session: 30 minutes

Geri Landry, University of TN, glandry@utk.ed, Clinical Assistant Professor and Director of School-based Experiences
Susan Benner, University of TN, sbenner@utk.ed, Associate Dean and Director of Graduate School of Education

Target Audience: Noyce Master Teachers, Project PIs, Co-Pis, Other Faculty/Staff, School and District Administrators
Topic: Supporting New Teachers

The TEACH/Here program offers induction support for teaching fellows as they begin their professional career teaching in high-needs secondary math and science classrooms. A goal for the Induction Program is to retain teachers as they grow professionally and provide assistance as they capitalize on their roles as leaders. The Induction Program provides teachers with several ongoing supports as they develop their own path for persevering through opportunities and challenges faced while teaching. Supports offered during the Induction Program include: monthly seminar meetings, group book studies, guest lectures, attendance at professional development workshops and conferences, classroom visits by university and district personnel, and social/emotion support. Teaching Fellows indicate part of their success is due to the comprehensive approach of the support, involving the total teaching experience. This session offers practical and helpful strategies for supporting teaching fellows, with a special focus on how book studies have been used. Presenters will share how books are chosen and the opportunities provided for interacting with authors. Excerpts from selective books will be highlighted and discussions of how information from the books translates to the experiences teaching fellows are living. A list of suggested books will also be provided.
Session 1:14b: 10:15am - 10:45am

1.14b Supporting New Teachers: Emerging Use of Classroom Observation Rubrics for Cognitive Coaching

Length of Session: 30 minutes

Imelda Nava, UCLA, inava@ucla.edu, Science Education Faculty
Jaime Park, UCLA, japark@gseis.ucla.edu, Math Education Faculty
Jody Priselac, UCLA priselac@gseis.ucla.edu, Associate Dean for Community Programs, Math Educator

Target Audience: Evaluators/Education Researchers, 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: Supporting New Teachers

Pre-service teachers spend a significant amount of time in the field. Yet, there is a lack of documentation of formative assessments, and feedback that teacher education programs use to support their candidates (Darling-Hammond, 2009). We share our classroom observation rubrics created by our urban teacher education program that reflect program core values, and how teacher educators use these rubrics with pre-service teachers for cognitive coaching, feedback and evaluation. Studies indicate the usefulness of standardized observation protocols, such as a classroom observation rubric. Rubrics have been shown to assess a teacher’s skill in the classroom (Piata & Hamre, 2009). We share two novel Secondary Math and Secondary Science Classroom Observation Rubrics (Nava et al., 2015). These rubrics have 4 domains: 1) Content Rigor, 2) Content Discourse, 3) Equitable Access to Content, and 4) Classroom Ecology, totaling 11 teaching sub-dimensions. Teacher educators and master teachers used the rubrics primarily for feedback and evaluation under the Cognitive Coaching Support Functions: 1) Coaching: reflective conversations, 2) Collaborating: communication of best practices between university and field, 3) Consulting: in university methods and field, and 4) Evaluating: using scores for evaluation (Costa & Garmston, 2010). We will engage participants in the use of the rubrics for feedback, coaching and evaluation of pre-service teachers. Given that time in the field varies for Noyce Fellows, we would appreciate feedback regarding any specific considerations and accommodations that might be needed in using these rubrics with our Noyce Fellows as we move this work forward.

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

1.15a Community-Based Middle School STEM Teacher Preparation: Duke University Capacity Building Project

Length of Session: 30 minutes

Kate Allman, Duke University, kate.allman@duke.edu
Director, Master of Arts in Teaching (MAT) Program

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Noyce Master Teachers, 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)

This workshop will describe a new community-based model to preparing middle grades STEM teachers created by Duke University’s Master of Arts in Teaching (MAT) Program. The session will highlight coursework and field experiences that prepare pre-service middle school science and math teachers to imbed community-based learning and teaching in the classroom.

Session 1:15b: 10:15am - 10:45am

1.15b Community Organizations: Programming and the Development of Community Science Teachers

Length of Session: 30 minutes

Maria Varelas, University of Illinois at Chicago, mvarelas@uic.edu
PI and Professor
Daniel Morales-Doyle, University of Illinois at Chicago, moralesd@uic.edu, co-PI and Postdoctoral Research Associate

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

Project SEEEC (Science Education for Excellence and Equity in Chicago) aims to prepare urban science teachers whose practice is responsive to the communities in which they teach. This requires a multifaceted approach to teacher education
that includes opportunities to understand urban communities as complex places, rejecting essentialist and/or superficial understandings that are rooted in either deficit or romanticized conceptions of disinvested neighborhoods. In project SEECC, we partner with non-for-profit organizations that provide programming so we can attend in intertwined ways to issues of equity, social justice, and science content. One such organization LVEJO (Little Village Environmental Justice Organization) provides a Toxic Tour that emphasizes both environmental challenges and community assets in one Chicago Mexican immigrant community. Using findings from a research study, we will share how the Toxic Tour provided an opportunity for the pre-service teachers to develop a complex understanding of this particular community, and in some cases to critically reflect on their own communities, identifying both structures that are enabling or disabling for community members and the people’s individual and collective agency acting upon these structures. We will also discuss how the Toxic Tour encouraged pre-service teachers to think about the connection between science concepts and issues of social justice at varying levels of specificity as it relates to science curriculum, and their roles as science teachers.

1.16 About the NSF Robert Noyce Teacher Scholarship Program

Length of Session: 75 minutes

Sandra Richardson and Kathleen Bergin, Program Directors, Robert Noyce Teacher Scholarship Program, DUE, NSF

The Division of Undergraduate Education at the National Science Foundation promotes excellence in undergraduate science, technology, engineering and mathematics (STEM) education for all students and provides opportunities for institutions and professional organizations to obtain funding for projects that address current challenges and opportunities in undergraduate STEM education. The Robert Noyce Teacher Scholarship Program responds to the critical need for K-12 science and mathematics teachers by recruiting and preparing talented STEM majors and professionals to become STEM teachers in high-need school districts. Noyce investments support the development of new models for preparing teachers and the expansion of the nation’s capacity to recruit, prepare and retain STEM teachers in high-need districts. This presentation will offer an overview of the Noyce Program, including differentiation between the four tracks of the program and holding a Q & A session regarding the recently released Noyce solicitation (NSF 16-559).

Session 2: Friday, July 22, 2016
10:15am - 11:15am

2.1 A Clinical Residency Model for Preservice Mathematics Methods Classes

Length of Session: 60 minutes

Jennifer Lewis, Wayne State University, jmlewis@wayne.edu, Assistant Professor, PI and Director, TeachDETROIT

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Non-Profit Organization Personnel, 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)

In this session, participants will view and analyze video and other artifacts of practice from pre-service mathematics methods classes that are held in school sites, integrated into field experiences. Modeled after clinical coursework in other professions such as medicine and nursing, this clinical residency model is designed to support teaching interns’ growing mathematical knowledge, their pedagogical skill, and their experience with children of color living in poverty and their families. Evidence of efficacy from the first year of this innovative clinical residency will be shared, particularly regarding interns’ cultural competencies, their expanded mathematical knowledge for teaching, and their teaching expertise. In addition, this clinical method narrows the gap between theory and practice, and prepares candidates to work successfully in high-poverty urban settings.

2.2 Learning Relationships--Community, School Sites and Students

Length of Session: 60 minutes

Eli Kirshbaum, Mills College, elikirshbaum@gmail.com, Noyce Teaching Fellow
Karen Mayfield-Ingram, Oakland Urban Teacher Residency Director
Steve Luntz, Student Teacher Supervisor

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
2.3 Innovative Practices and Teacher Preparation for "Re-Careering" STEM Professionals

*Length of Session: 60 minutes*

Karen Nave, Rio Salado College, Karen.Nave@riosalado.edu, Program Manager
Jennifer Gresco, Rio Salado College, Jennifer.Gresco@riosalado.ed, PI, Faculty Chair for Educator Preparation Program
Bridget Bambling, Rio Salado College, bbamcli@aol.co, Noyce Scholar, 8th Grade Science Teacher

*Target Audience:* Higher Education Institution Administrators, Noyce Master Teachers, Noyce Teaching Fellows, 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)

The workshop will focus on innovative strategies and benefits of collaborative partnerships with school districts and “re-careering” STEM professionals. Focus will be given to outlining and discussing best practices associated with practical field experiences and student teaching experiences. Additional emphasis will be given to building partnerships with industry experts and formalizing recruitment efforts that benefit employees who are seeking to re-career or nearing retirement and looking for another career. These transitioning STEM professionals can then make a social impact and influence the next generation of math and science students. Noyce Scholars will present their experiences of transitioning, preparing, and training for the 6-12 grade math or science classrooms and will specifically discuss their overall preparedness for working with students from high-poverty, high-need school districts. The Noyce Scholars will share their stories of successful navigation through the Rio Salado College online hybrid Educator Preparation coursework, including its enhanced focus on STEM, 150 hours of field experience, twelve weeks of student teaching, and support through its newly designed induction model for preservice post-baccalaureate students. The workshop will be highly interactive with participants being invited to share how their Noyce program is promoting hands-on experience to prepare better STEM teachers.

2.4 Enhancing STEM Curricula and Engaging More Students To Teach Through Science Outreach

*Length of Session: 60 minutes*

Linda Rayor, Cornell University, LSR1@cornell.edu, Lecturer and Facilitator

*Target Audience:* Higher Education Institution Administrators, Noyce Master Teachers, Noyce Teaching Fellows, 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)

Formally training high school or college undergraduates how to do effective scientific outreach greatly enhances the probability that these students will go on to become STEM teachers or to continue to do informal science education that communicates the value of science to the public through their careers. Doing science outreach directly benefits college students’ engagement and skill in STEM education. The outreach and teaching experience is empowering and engenders a sense of community, especially when perceived as a form of civic engagement. In this workshop I will share several approaches for developing science outreach classes, programs, or community outreach events that help serve as a pipeline into science teaching while simultaneously benefiting science education in urban environments. The workshop will be focused on techniques for training outreach skills based on my Cornell University Naturalist Outreach course (http://blogs.cornell.edu/naturalistoutreach), Insectapalooza, a 17-year outreach program. While there is increasing recognition that doing outreach is as beneficial to the presenters as the recipients, too many programs don’t provide their H.S. or undergraduates with sufficient guidance on what it takes to effectively engage their audiences, or best practices while teaching. The result is often frustrated and ineffectual presenters, and unengaged listeners instead of lively participants. In this presentation, I will discuss how the basics of the Naturalist Outreach science outreach program can be transferred to other institutions to improve the STEM teaching pipeline. Participants in the workshop will develop a draft for comparable outreach training programs they want to develop in their home institution.
2.5 The PRNP New Teacher Support Program: Offering STEM Educators an Individualized Induction Adventure

**Length of Session: 60 minutes**

Greer Richardson, La Salle University, richards@lasalle.edu, Co-PI-Philadelphia Regional Noyce Partnership
Victor Donnay, Bryn Mawr University, vdonnay@brynmawr.edu
Bonnie Hallam, Bryn Mawr University, bhallam@brynmawr.edu

**Target Audience:** Higher Education Institution Administrators, Project Pls, Co-Pls, Other Faculty/Staff  
**Topic:** Supporting New Teachers

Despite national efforts to support the recruitment and preparation of new STEM teachers, research shows that many will leave the classroom after their first year. The Philadelphia Regional Noyce Partnership (PRNP), a collaboration of 7 institutions of higher education receiving Noyce awards and one local STEM-focused organization, considered the statistics around new teacher retention and created a program to sustain and retain these newly minted STEM teachers. Based on promising practices in teacher induction, the PRNP developed a two-year pilot program centered on teacher identified, needs-based, and individualized support entitled the New Teacher Support Program (NTSP). In year one, new teachers receive mentoring support, professional development, opportunities for networking and access to web-based resources. Mentors adopt a coaching stance and facilitate new teacher-led, goal-directed interactions to address their instructional, professional and self-care needs, which puts teachers in the driver’s seat, fostering their agency and self-efficacy. In year two, new teachers transition to school-based collaborators as they work toward their goals. New teachers are afforded opportunities to develop teacher leadership in their schools and within the project. Participants in this workshop will: explore key aspects of this model as it differs from traditional induction approaches; learn about the benefits of the model for its participants; and share strategies on how regional Noyce partnerships can pool resources to enhance experiences for STEM teachers.

2.6 Noyce Teacher Leadership: Opportunities and Leadership Trajectories

**Length of Session: 60 minutes**

Wendy Smith, University of Nebraska-Lincoln, wsmith5@unl.edu, Research Associate Professor
Lindsay Augustyn, University of Nebraska-Lincoln, laugustyn2@unl.edu, Communications and Outreach Director
Jason Vitosh, Falls City Public Schools, jvitosh@fallscityps.org, Math Teacher and Noyce MTF
Susie Katt, Lincoln Public Schools, skatt@lps.org, Elementary Math Coach and Noyce MTF

Jamisen Goodell, Bryan High School, jamisen.goodell@ops.org, Math Teacher and TF

**Target Audience:** Evaluators/Education Researchers, Higher Education Institution Administrators, Noyce Teaching Fellows, Project Pls, Co-Pls, Other Faculty/Staff, School and District Administrators, Undergraduate and/or Graduate Noyce Scholars  
**Topic:** Teacher Leadership

We will share cases of teacher leadership in Nebraska, as part of NebraskaNOYCE Phase I and Phase II. NebraskaNOYCE (2011-2016) recruited 30 MTFs and 13 TFs, and Phase 2 (2014-2017) continues to study these Noyce scholars. The NebraskaNOYCE scholars all have engaged in a wide variety of teacher leadership, from becoming math coaches, to leading local professional development for peers, to giving presentations at state and national math teacher conferences, to chairing curriculum committees. Three Noyce scholars (two MTFs and one TF) will share highlights of their leadership journeys, and will lead a discussion about how school-university partnerships can provide opportunities for teacher leadership. We will share how MTFs and TFs have become teacher leaders, while remaining classroom mathematics teachers in high-need districts. We will discuss how to engage school partners (especially principals) in this vision of distributed teacher leadership, so that attendees will gain ideas for promoting local teacher leadership. We will spend 10 minutes providing an overview of the Noyce projects in Nebraska. Each of the three teachers will then spend 5 minutes sharing their teacher leadership journeys. The remaining 35 minutes will be spent in a discussion about how to create and support teacher leadership opportunities for Noyce scholars.

2.7 Staying the Course: Thriving in Your First School and First Year of Teaching

**Length of Session: 60 minutes**

Alisun Thompson, University of California Santa Cruz, alisun@ucsc.edu, Postdoctoral Researcher
Gretchen Andreassen, University of California Santa Cruz, gha@ucsc.edu

**Target Audience:** Noyce Teaching Fellows, School and District Administrators  
**Topic:** Supporting New Teachers

It has been well established that the teaching profession suffers from disproportionate levels of attrition; seventy five percent of the need for new teachers is due to teachers leaving the profession prematurely, usually as a result of unsatisfying working conditions (Borman & Dowling, 2008; Darling-Hammond & Sikes, 2003; Ingersoll, 2001). Current research has documented that this is particularly true for math and science
teachers and has recast the math and science teacher “shortage” as an issue of retention rather than inadequate supply (Ingersoll, 2003; Ingersoll & Perda, 2010). It has been argued that policies to increase the supply of teachers will fall short if they are not partnered with policies that address the problem of attrition. To ameliorate persistent shortages of math and science teachers, we must have a nuanced understanding of the conditions that attract and retain teachers in high need schools. This workshop presents a longitudinal study of 39 Noyce teachers in their first years of teaching. The study finds that particular working conditions as well as how teachers choose their workplaces matter a great deal when it comes to teacher satisfaction and teacher retention. Using interactive strategies to engage participants, the workshop will present data on what constitutes a supportive workplace and how to proactively choose a school that provides these conditions.

2.8 Launching of Project Firebirds Reinventing STEM Teaching (Project FRST): Innovation and Creativity

**Length of Session: 60 minutes**

Lena Walton, University of the District of Columbia, lwalton@udc.edu, PI, Associate Professor Education and Associate Dean, College of Arts and Sciences
Toelssa Dekissia, University of the District of Columbia, tdeksissa@udc.edu, Co-PI, Program Director, Water Resources Research Institute, College of Agriculture, Urban Sustainability, and Environmental Sciences

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)

Project FRST will train 20 minorities to teach middle school science. The program includes a Master of Arts in Teaching (MAT) science, and mentoring for the first four years of teaching. Project FRST has three major highlights. It is highly interdisciplinary with Co-PIs and key project personnel from five disciplines (computer science, environmental Sciences, biology/life sciences, chemistry and science teacher education) working collaboratively to plan and make decisions about the program. The second highlight is the program format which includes a 15-week internship with a scientist, technologist or engineer prior to starting the science education core and pedagogy requirements. Third, the science methods courses feature distinct modules about the professional language of science which addresses pedagogy relevant to the diversity of students found in urban classrooms.

This session will describe the structure and requirements of the MAT program and highlight challenges and successes in the planning and implementation. Participants will learn about the design of an innovative STEM teacher education program and creativity of project personnel in navigating the challenges of program implementation. Two features will be discussed: (1) the science internship, a 15-week placement with a practicing scientist, technologist or engineer; and (2) early field experiences’ structure and requirements. The session will be highly interactive consisting of small group analyses and discussions of scenarios developed from challenges faced, decisions made and the decision-making process by the project team, followed by whole group discussions.

2.9 Using Cultural Context to Motivate Mathematics Students

**Length of Session: 60 minutes**

Leah McCoy, Wake Forest University, mccoy@wfu.edu, PI

Target Audience: Noyce Master Teachers, Noyce Teaching Fellows, Undergraduate and/or Graduate Noyce Scholars
Topic: Teaching a Diverse Student Population

One of the major issues faced by mathematics teachers, both novice and experienced, is lack of motivation in students. It is a constant challenge to engage and involve students. While the mathematics in the curriculum is a major focus, it is also important that students learn to apply it in context. One interesting context for many students is a culture-based application. Our teacher candidates prepare and carry out lesson activities and projects that include a variety of contexts from diverse cultures. This presentation shares procedures, materials and outcomes from long-term use of this project. It includes examples of completed projects as well as advice for implementation of these or similar projects in K-12 mathematics classrooms. Examples include Patchwork Quilts, Navajo Code-Talkers, Islamic Art, Toma Todo, and Mancala. These activities are successful for a number of reasons. They use sound pedagogy, including group collaboration and communication. Reflection is encouraged and outcomes are communicated in a variety of oral and written products. These projects provide a rich and interesting context for applying mathematical concepts and developing problem solving and computational skills. The activities might serve as an introduction or enrichment portion of a mathematics unit. They provide a relevant connection between the mathematics and the diverse world.
The following workshops are 30-minute workshops, sharing breakout rooms during Session 2:

**Session 2:10a: 10:15am - 10:45am**

**2.10a Enhancing Classroom Instruction on a Budget with GeoGebra**

*Length of Session: 30 minutes*

Peter Eley, Fayetteville State University, peley@uncfsrc.edu, Noyce Scholar Seminar Presenter, Faculty Mentor, University Supervisor for Clinical Experience Interns
Gabrielle Alexander-Lee, Fayetteville State University, galexan37@gmail.co, Noyce Fellow

*Target Audience: Undergraduate and/or Graduate Noyce Scholars*

*Topic: Resources for Teachers*

GeoGebra is a free Dynamic Geometry® software that is similar in function to Geometry’s Sketchpad®. Using technologies such as GeoGebra foster equity in the classroom and does so in a very economical way. Students attending this presentation are introduced to some of the basic concepts of how to engage students with GeoGebra and how to extend its use outside of the classroom into project-based learning. Students will find that GeoGebra is a multi-purpose platform that uses geometry, spreadsheets and Computer Algebra Systems to bring mathematics concepts alive in a visually appealing way. Middle and high school teachers can find this tool as a effective alternative to graphing calculators.

**Session 2:10b: 10:45am - 11:15am**

**2.10b Using GeoGebra to Look Deeper: The Interplay Between Math, Tech, and Art**

*Length of Session: 30 minutes*

Kellie Evans, California State University Northridge, kellie.m.evans@csun.edu, Math Professor, PI
Bryant Cooper, California State University, bryant.cooper.928@my.csun.ed, Noyce Scholar (Math)

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

*Topic: Resources for Teachers*

Participants will experiment with the free and easy-to-use software, GeoGebra, and “play” with mathematical topics. Examples include golden triangles, geometric transformations and creating mosaics to tile your classroom floor. Bring a device with wireless and web browser (laptop or tablet recommended).

**Session 2:11a: 10:15am - 10:45am**

**2.11a Mentoring Builds Confidence in Students to Become STEM Pre-service Teachers**

*Length of Session: 30 minutes*

Keenya Mosley, Savannah State University, mosleyk@savannahstate.edu, Assistant Professor, Assessment and CAEP Manager, PI

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

*Topic: Recruitment and Marketing Strategies*

Students seeking programs of study often connect with fields where they believe they will have the most success. Recruiting students to become teachers can involve convincing them of their ability to be effective along with their strong content knowledge. It’s not uncommon for students, even the high academic achievers, to lack confidence about their prowess to positively impact student learning in P-12 classrooms. Teacher retention involves many facets with mentorship serving as one of the strongest components (Waterman & Ye He, 2011). But what about mentoring students as a recruitment strategy to attract them to the profession of teaching? This session will discuss how mentoring students have led to recruitment in teacher education programs.

**Session 2:11b: 10:45am - 11:15am**

**2.11b Characteristics and Perceptions Unique to Noyce Scholars: Do They Exist?**

*Length of Session: 30 minutes*

Jennifer Whitfield, Texas A&M University, jwhitfld@tamu.edu, aggieTEACH Director and Instructional Assistant Professor of Mathematics

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

*Topic: Research and Evaluation*

Though some research exists on factors that influence Noyce Scholars’ decision to enter the teaching profession and how the financial incentive of the scholarship impacted their decision to teach, little research has been conducted on
characteristics unique to Noyce Scholars. If more information on the unique perceptions and characteristics of Noyce Scholars can be identified, then universities can use this information during the recruiting and preparation phase to improve teaching and teaching programs. Comparing the perceptions of the Noyce Scholars on various aspects of teaching and the teaching profession with a similar group of teachers who did not receive the Noyce scholarship can shed some light on the characteristics unique to Noyce Scholars. Texas A&M University researchers will share the results of a mixed-methods study that compare the characteristics and perceptions of participants who received a Noyce Scholarship to those who did not.

Session 2:12a: 10:15am - 10:45am

2.12a A Pathway Paved with Good Intentions: Pre-Service Phase to Induction Phase

Length of Session: 30 minutes

Gabrielle Alexander-Lee, Fayetteville State University, galexan37@gmail.com, Noyce PrEP Fellow
Perry Gillespie, Fayetteville State University, pgillespie@uncfsu.ed, Noyce PrEP Co-PI

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, 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)

The Fayetteville State University Noyce PrEP program provides an array of experiences, internships, mentorships and professional development opportunities from the pre-service teacher phase through the induction phase. Take a look at the vital components and model of our program through the eyes of our Noyce Fellow regarding professional learning via comprehensive, coherent, content-specific, and sustained activities, goals, and networks.

Session 2:12b: 10:45am - 11:15am

2.12b Lessons Learned: Selecting, Mentoring, and Monitoring Noyce Scholars

Length of Session: 30 minutes

Mark Wathen, Utah Valley University, mark.wathen@uvu.edu, Associate Professor, Co-PI

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

Topic: Project Management

This workshop will focus on lessons learned throughout the past six year of administering the Robert Noyce Teacher Scholarship Program at Utah Valley University. Participants will discuss collaborative efforts used to select the scholars, the development and implementation of a promissory note for selected scholars, and tracking procedures used for monitoring scholars as they continue throughout their teaching career.

Session 2:13a: 10:15am - 10:45am

2.13a Beyond the Pre-practicum: A Partnership for Changing Views of Mathematical Problem Solving

Length of Session: 30 minutes

Karen Anderson, Stonehill College, karenanderson@stonehill.edu, PI

Target Audience: Higher Education Institution Administrators, Non-Profit Organization Personnel, 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 session explores how Stonehill College utilizes the NUMB3RS Projects to provide supervised, field-based experiences to licensure candidates while strengthening our relationships with partner programs. NUMB3RS Projects are designed to provide licensure candidates with early field experiences that go beyond the traditional pre-practicum, where they are typically encouraged to follow the curriculum and management style of the master teachers with whom they work. Utilizing a model more akin to service learning, NUMB3RS Projects are designed to meet the needs of both our licensure candidates and our community partners. Thus, although the format for a NUMB3RS Project remains consistent (6 weeks, after traditional school hours), the mathematical content and presentation style varies depending upon the needs of partner programs.

Through participation in NUMB3RS Projects, licensure candidates work in teams alongside members of our Noyce Project Team to design and implement mathematical problem-solving of their own creation with students in prekindergarten through middle school. Through exposure creating and implementing problems that employ mathematics in non-traditional ways, our goal is to move the thinking of licensure candidates and the PK-12 students they work with beyond rote memorization to the development of a deeper conceptual
understanding of big ideas in mathematics. Additional benefits are the real-world classroom management experience our licensure candidates gain. This session will: (1) explain why the NUMB3RS Project model was created, (2) discuss how licensure candidates as well as partners are recruited, (3) share preliminary results from our first four semesters of implementation, (4) share sample materials designed.

Session 2:13b: 10:45am - 11:15am

2.13b Co-STEM to TEAM-UP: A New STEM Teacher Preparation Program Between Two Universities

*Length of Session: 30 minutes*

Gus Greivel, Colorado School of Mines, ggreivel@mines.edu, Teaching Professor
Rob Reinsvold, UNC, Robert.Reinsvold@unco.edu, Professor
Lori Reinsvold, UNC, lori.reinsvold@unco.edu, Director of the MAST Institute

Target Audience: Evaluators/Education Researchers, Higher Education Institution Administrators, Non-Profit Organization Personnel, 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)

How do you get two universities to collaborate on a common problem—the preparation of more highly qualified STEM teachers? TEAM-UP (Teacher Education Alliance, Mines-UNC Program) is a new STEM teacher preparation partnership program between the Colorado School of Mines (CSM) (a strong engineering school) and the University of Northern Colorado (UNC) (a strong teacher education school). This program provides an alternative path for CSM students who may wish to consider teaching science or mathematics, instead of engineering, as a profession. Students complete all their content coursework through CSM and start taking education courses through UNC (mostly online or on the CSM campus). Then, after graduation with a BS from CSM, they have one more semester of student teaching supervised through UNC to meet the requirements for teacher licensure. The first cohort of CSM students enrolled in the program in Fall 2015. The collaboration itself is a case study for how two universities can combine their respective strengths to address the needs of all of their students and meet the national need for a more comprehensive preparation of secondary science and mathematics teachers who have the skills to integrate scientific inquiry, technology design, engineering problem solving and mathematical analysis into cohesive and meaningful learning experiences for their students. The presentation will discuss the lessons learned from the process of getting two universities to collaborate rather than compete. Key to the success is support from all levels of each campus. Student interest, faculty leadership, and administrative support were critical to the success of the development of this program. Two unique features of our program is a team of Teachers-in-Residence and a Teacher Advisory Group that helped provide the teacher perspectives to the development and success of the new program.

Session 2:14a: 10:15am - 10:45am

2.14a Noyce Teacher Candidates: Initial Pedagogical Orientations Towards Science Teaching

*Length of Session: 30 minutes*

Frackson Mumba, University of Virginia, mumba@virginia.edu, Program Evaluator
Kara Baldwin, Illinois State University, kebald1@ilstu.edu, Graduate Assistant
Rebekka Darner Gougis, Illinois State University, rldarne@ilstu.edu, Principal Investigator

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

Topic: Research and Evaluation

Pedagogical orientation is theorized as one of the components of Pedagogical Content Knowledge (PCK) (Magnusson et al., 1999). PCK is the knowledge base that enables teachers to make content understandable for their students (Shulman, 1987). As such, science teachers' pedagogical orientations influence their decisions about the content, instructional strategies, and assessment. Pedagogical orientations towards science teaching can be characterized along a spectrum of two variants of inquiry (guided inquiry and open inquiry) and two variants of direct instruction (didactic direct, active direct) (Schuster & Cobern, 2011). Therefore, the success of quality inquiry instruction in science classrooms may largely depend on teachers' sound pedagogical orientation towards inquiry science teaching. One of the objectives of the Illinois State University Noyce scholarship program is to develop sound pedagogical orientations towards inquiry science teaching among Noyce teacher candidates. This study reports on the pedagogical orientations towards science teaching held by the first cohort of Noyce teacher candidates before they received the training in inquiry science instruction. Pedagogy of Science Teaching Test 1 (POSTT-1) instrument was used to identify the Noyce teacher candidates' pedagogical orientations towards science teaching. Items depict actual scenarios for teaching particular science topics and provide four alternative teaching method options. Data is still being
analyzed. Preliminary results show that Noyce scholars’ initial pedagogical orientations towards science teaching are in the following descending order: didactic direct teaching, active direct teaching, and guided Inquiry instruction. No participant had pedagogical orientation towards open inquiry. Detailed results and implications will be discussed.

Session 2:14b: 10:45am - 11:15am

2.14b Essay Analysis for the Study of Noyce Scholars’ Self-Growth and Perceptions

Length of Session: 30 minutes

John Schaumloffel, SUNY Oneonta, john.schaumloffel@oneonta.edu, Co-PI
Paul Bischoff, SUNY Oneonta, paul.bischoff@oneonta.edu, PI
Paul French, SUNY Oneonta, paul.french@oneonta.edu, Co-PI

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

The first SUNY Oneonta Noyce Scholars program engaged twenty-two students who expressed an interest in teaching science in high-needs school districts. Of these students, sixteen are currently teaching in high-needs districts and were able to fully participate in this study. Using a combination of qualitative and quantitative techniques, the Noyce co-PIs have evaluated changing student perceptions about teaching in high-needs schools. Perceptions in areas of experiences, challenges, goals, satisfaction and confidence, and professional knowledge and skills were examined across a series of essays that students wrote in the initial phases of their professional careers (program application, pre-service and in-service). This workshop will focus on the methods used in this evaluation, including: the design of the essay sequence, essay analysis—both quantitative and qualitative, and the interpretation of the results.

Session 2:15a: 10:15am - 10:45am

2.15a A Model for Continued Support for Math Scholars

Length of Session: 30 minutes

Elsa Medina, Cal Poly State University, emedina@calpoly.edu, Professor, Co-PI
Ben Woodford, New Tech High School, endino111@gmail.com, Teacher and Scholar

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

The Cal Poly Math Noyce Scholarship program received funding from NSF to offer summer workshops for scholars from our program and from programs in the western region. During the last three years, about 50 mathematics scholars have attended the workshops each summer. The workshops’ evaluations have been very positive and scholars have stated that these workshops are one of the best components of our program. In this talk we will share our workshop’s model and examples of scholars’ activities and problems. A scholar will also share his experiences in the workshops.

Session 2:15b: 10:45am - 11:15am

2.15b Free Interactive Online Math and Computer Science Resources for Classrooms

Length of Session: 30 minutes

David Torres, Northern New Mexico College, davytorres@nnmc.edu, PI, Chair of Mathematics and Physical Science

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 workshop will introduce free online interactive sites: Sweet Home 3D and Scratch. Sweet Home 3D was developed by Emmanuel Puybaret and eTeks and allows students to develop multistory floor plans (with 3D visualization) of homes with furniture while teaching area and length. Scratch was developed by the Lifelong Kindergarten Group at MIT Media Lab and allows students to learn computer science and logic while creating animations and games through a user-friendly interface. We will conclude the workshop with Microsoft Movie Maker which teachers and students can easily use to create a slideshow with an audio track to capture a learning experience.
ABOUT DISCUSSION GROUP SESSIONS

About the 2016 Noyce Summit Discussion Group Sessions on Identifying a Research Agenda for Preservice Education of STEM Teachers in High-Need Schools

AAAS Initiative on Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools - Supported by the NSF Robert Noyce Teacher Scholarship Program

The desired outcome of the discussion groups sessions on Identifying a Research Agenda for Preservice STEM Teacher Education in High-Need Schools is to get input on key questions and format for commissioned papers on effective preservice education of STEM teachers in high-need schools. The discussions will also focus on identifying methods, indicators and ways to improve methodology and research linkages. Objectives for discussion groups include, identifying:

- What do we know from current research (by grade level taught) and what do we want to know?
- What are the key questions for the commissioned papers?
- Are there proposed research questions that are specific to a particular STEM discipline?
- What are the strengths and weaknesses of indicators and methods used for this research strand and suggestions for new indicators and/or methods associated with STEM teacher preparation programs?
- What are the challenges for research implementation?
- What are suggestions for improving research linkages among the community of preservice STEM teacher education researchers (developing data collection guidelines and definitions, using common research methods and developing models that will permit cross-comparison of findings in a wide range of studies)?
- What are strategies for increasing the number of researchers in this area?
- Who are possible authors for commissioned papers?

The small discussion group sessions will not include formal presentations and discussions will focus on one of five research strands. The five research strands are centered on effectiveness, retention, and/or persistence of STEM teachers in high-need local educational agencies.

These research strands were identified from the National Academy of Sciences report, Preparing Teachers: Building Evidence for Sound Policy (http://www.nap.edu/download/12882) and by the Advisory Board for the AAAS Noyce Initiative on Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools

The five research stands include:

1. Features that make preservice STEM teacher education programs and/or pathways effective and attractive to academically accomplished teacher candidates in STEM fields (Attracting high quality candidates for STEM teaching).

2. Characteristics of clinical experiences that affect STEM outcomes (a) for preservice STEM teacher education candidates and (b) for the students of those candidates (Effective clinical experiences).

3. Aspects/characteristics/components of preservice STEM teacher education programs (including induction programs) that make them attractive and effective in retaining academically accomplished STEM teachers in high-need educational settings (STEM teacher retention and persistence).

4. Ways that teachers’ knowledge (e.g., STEM content knowledge, STEM pedagogical competence, effectiveness of teacher candidates) and non-cognitive factors (e.g., commitment to teaching in high-need schools) affect outcomes for those preparing to be teachers and students who are taught by these new teachers (STEM teacher effectiveness);

5. Preparing current and prospective teachers for STEM teaching and learning opportunities of the future (Preparing teachers for the future)

Each small group will be guided by a facilitator who participated in a working group meeting on and drafted an initial report to guide the work of authors who will be commissioned to produce (a) final paper(s) on the research topic(s). Based on discussions during the Noyce Summit, facilitators will further refine their reports.

Reports will be reviewed by the Advisory Board for the AAAS Noyce Initiative and the Board will make final decisions about topics, guidelines, and writers for commissioned papers.
Discussion Group Session Leaders

Nathan Alexander, University of San Francisco
Jaime Arvizu, California State University, Fresno
Sandra Blumenrath, AAAS
Ann Cavallo, The University of Texas at Arlington
Brent Duckor, San Jose State University
Lloyd Douglas, Mathematical Association of America
Maria Fernandez, Florida International University
Kimberley Freeman, Howard University
Billy Jackson, University of Tennessee Chattanooga
Heather MacDonald, College of William & Mary
Melissa McCartney, AAAS
Anthony Petrosino, The University of Texas at Austin
Donna Ross, San Diego State University
Regina Sievert, Salish Kootenai College
Gay Stewart, West Virginia University