

## Plenary Flash Talks

### A peek into how ITEST is preparing today's youth for tomorrow's workforce

In these Flash Talks, modeled on Ignite (<http://www.ignitetalks.io/>), presenters get 20 slides, which automatically advance every 15 seconds. The result is a fast and fun presentation which lasts just 5 minutes. During the presentations, ITEST grantees will share their projects' innovative practices and compelling outcomes to demonstrate how ITEST-engaged students are gaining the foundational skills necessary to be successful in the future science and engineering workforce. The featured projects represent the diversity of programming in the ITEST portfolio and range in discipline, grade span, geographic location, and context, among other things. During this hour, we will hear from 4 ITEST projects and then break to share our thoughts with each other at our tables. We will then hear from another 4 ITEST projects and then engage once more in conversations at our tables.

#### Presenters:

1. **Jeremy Babendure**, Research Fellow, Institute for Learning Innovation  
PI of *Chief Science Officers: A Strategy for Student Awareness and Industry Engagement*
2. **Cheryl Bauer-Armstrong**, Director of Earth Partnership, University of Wisconsin-Madison  
**Michelle Cloud**, Ho-Chunk Nation Division Manager, HCN Education Department  
PI and Co-PI of *Earth Partnership: Indigenous Arts and Sciences - Connecting STEM to Native Science*
3. **Nicholas Garafolo**, Assistant Professor, University of Akron  
Co-PI of *Zippping Towards STEM: Integrating Engineering Design into the Middle School Physical Science Curriculum*
4. **Kevin Glass**, Director, EdAdvance  
Evaluator of *Skills21STEMStarter: An Incubator and Launch Pad to STEM Entrepreneurship and Careers*
5. **Fred Martin**, Associate Professor, University of Massachusetts Lowell  
**Lijun Ni**, University of Massachusetts Lowell  
**Diane Schilder**, Principal Evaluation Consultant, Evaluation Analysis Solutions Inc.  
PI, Project Consultant, and Co-PI of *Middle School Pathways in Computer Science*
6. **Karl Reid**, Executive Director, National Society of Black Engineers  
PI of *Strengthening the STEM Pipeline for Elementary School African Americans, Hispanics, and Girls by Scaling Up Summer Engineering Experiences*
7. **Selma Šabanović**, Associate Professor, Indiana University Bloomington  
PI of *Human-Centered Robotics Experiences for Exploring Engineering, Computer Science, and Society*
8. **Takumi Sato**, Clinical Assistant Professor, Virginia Tech  
Co-PI of *Actualizing STEM Potential in the Mississippi Delta*

## Thematic Meetups

The purpose of the Thematic Meetups is to broker connections between individuals in the community who want to learn more about a topic or method with those who have expertise in these same areas. During this session, participants can seek advice on project-specific issues, share knowledge and resources, and connect with others interested in a topic in a facilitated discussion format. There will be two opportunities at the Summit to engage in small group discussions around a topic of your choice.

**Thursday, June 15, 1:45-3:00 pm**

Session Title, Facilitators and Location	Topic Description
<b>Sustainability and scaling up</b> <i>Janet Beissinger, Candiya Mann, Alexander Repenning</i> Ballroom A	Discuss issues and experiences in regards to sustaining or scaling up a K-12 STEM education project.
<b>Strategies for teacher and student recruitment and retention</b> <i>Melissa Demetrikopoulos, Nancy Peter</i> Ballroom B	Share successful strategies for teacher and student recruitment and retention and thoughts on how to make improvements.
<b>Effective partnerships - the good, the bad, and the ugly</b> <i>Alice Anderson, Elizabeth Baird, Janelle Johnson, Kristie Patten Koenig, Karl Reid</i> Ballroom C	Explore what makes partnerships work and create a “top five” list of things to keep in mind for successful partnerships with industry, schools and informal institutions.
<b>Mentoring for impact and success</b> <i>Kate Popejoy, Lissa Soep, Eli Tucker-Raymond</i> Salon 1	Explore promising models for peer-to-peer and youth-adult mentorship, especially for environments geared for young people underrepresented in STEM.
<b>Smart and connected communities: the ITEST context</b> <i>Lauren Birney, Ron Gray, Robert Russell</i> Salon 2	Discuss existing projects that leverage networks and technologies to create meaningful community engagement in STEM and opportunities for unique collaborations.
<b>Press and media strategies for disseminating project outcomes</b> <i>Mike Barnett, Sharon Locke</i> Salon 3	Discuss how the press and media can be leveraged to raise visibility of project work and disseminate project outcomes to a variety of stakeholders.

## Thematic Meetups (continued)

Friday, June 16, 12:45-2:00 pm

Session Title, Facilitators and Location	Topic Description
<b>Cultural competence in program development and implementation</b> <i>Monique Jethwani, Janelle Johnson, Joel Mejia, Rosio Pedroso</i> Ballroom A	Engage in conversation around incorporating cultural competence and equity in STEM program development and implementation.
<b>Implementing high-quality research designs</b> <i>Kirk Knestis, Caroline Parker, Nancy Songer</i> Ballroom B	Draw on facilitators' 75 years of collective experience planning, implementing, learning from, and sharing high-quality research designs in classroom and informal settings.
<b>Developing effective instructional and curricular models for educators</b> <i>James Diamond, Jacquelyn Kelly, Ari Krakowski, John Ristvey</i> Ballroom C	Discuss challenges and strategies to developing instructional materials and curriculum for your project.
<b>Incorporating online teaching and learning with emerging technologies</b> <i>Alec Bodzin, Bradford Davey, Kim Spangenberg</i> Salon 1	Explore best practices, design principles, and implementation challenges for integrating new and emerging learning technologies.
<b>Involving parents/families/caregivers in project implementation</b> <i>Joseph Gardella, Joyce Massicotte, Dale McCreedy, Charles Xie</i> Salon 2	Share and discuss experiences and perspectives on engaging parents, families, and caregivers in promoting STEM learning.
<b>Engaging principals, guidance counselors, and other administrators to promote STEM-learning experiences</b> <i>Daniel Heck, Kenric Kesler, Keith Trahan</i> Salon 3	Strategies for partnering with school administration for long term, sustainable STEM experiences for students.

## Strand Sessions

The purpose of the strand sessions is to allow Summit participants time to dig deeply into a topic of interest. Strands are organized around four topics - one regarding research and evaluation and three each regarding a Big Idea of NSF<sup>1</sup>. Each strand will meet in two cumulative sessions over the two-day Summit and will work towards strand-specific goals and outcomes. Each strand will follow its own agenda, which is posted on the STELAR website and available in handout form at the registration table. In general, strand participants will hear presentations from their fellow ITEST grantees, engage in group discussions and workshops, and determine what future work will take place within their strand over the next 12 months. Summit participants will have the opportunity to hear a summary of each strand's discussion and future work during the afternoon plenary session on Friday.

Each participant signed up for a strand in their online Summit registration. The strand you chose appears on your name badge.

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<sup>1</sup> [https://www.nsf.gov/about/congress/reports/nsf\\_big\\_ideas.pdf](https://www.nsf.gov/about/congress/reports/nsf_big_ideas.pdf)

## Strand 1. Sharing effective approaches and instrumentation for ITEST research and evaluation

### *Salons 1-2*

ITEST projects include research and evaluation components aimed at improving the innovative educational experiences they implement and measuring the impact those experiences have on participants. These components serve not only to evaluate the ITEST project, but also to advance the knowledge base of the field. Instruments that accurately measure outcomes of interest are integral to well-designed studies, and the use of common instruments across studies can improve the synthesis of findings across disparate models. However, it is challenging to find instruments precisely relevant to ITEST's unique projects and to the diverse populations who make up ITEST participants. This strand will support researchers and evaluators in identifying rigorous, robust, and relevant instrumentation for projects within the ITEST community. Attendees will learn about existing instruments, considerations for instrument selection, and strategies for instrument adaptation. Attendees will share approaches and tools with colleagues who focus on similar student or teacher outcomes.

#### Day 1: Locating robust, rigorous, and relevant instruments and protocols

- Showcase: Instruments and protocols for measuring learning activation (*Mac Cannady*), professional development (*Nancy Peter*), career awareness (*Tandra Tyler-Wood*) and computational thinking (*David Webb*)
- Small group discussions: What outcomes does your project measure? What tools does your project use to measure the outcomes of interest?

#### Day 2: Considerations for instrument selection and strategies for instrument adaptation

- Presentation: What to consider when selecting tools that best match research and evaluation efforts to programmatic goals (*Melissa Demetrikopoulos*)
- Presentation: A primer on validity and modifying instruments and protocols (*Tandra Tyler-Wood*)
- Presentation: Using instruments and protocols in mixed methods designs (*Hilarie Davis*)
- Workshop: What does your project have to consider regarding instrumentation? What challenges are your project facing regarding instrumentation? What are your next steps?

#### Strand goals:

- Attendees will learn about new instruments; reflect on and discuss rigorous, robust, and relevant instruments and protocols; connect with colleagues and share resources
- STELAR will have ideas on how to best augment the current instrument database to meet the needs of the ITEST community. Participants may wish to be advisors/reviewers.

## Strand 2. Fostering innovation through inclusion and diversity in STEM education and the workforce

### *Ballroom C*

Real breakthroughs and innovations in STEM occur at the intersection of diverse perspectives and experiences, and when people from disparate backgrounds work together to address common issues. To create, innovate and be competitive in a global economy will require a large cross-section of people, across the Nation, entering STEM pathways. Similar to NSF INCLUDES initiative, the ITEST program has a history of engaging youth, particularly those from populations most underrepresented in STEM, in hands-on, problems-based, real-world applications of STEM concepts and skills. The first session in the strand will share NSF's vision for the INCLUDES program and identify synergies across the two program communities. The second session will identify and articulate specific strategies that ITEST projects are successfully implementing with specific populations of youth to foster their interest and motivation to pursue STEM educational and career pathways. The group will also examine common challenges and possible solutions to successful implementation of project work.

#### Day 1: The NSF INCLUDES and ITEST Programs: Synergies & Opportunities

- Goal: Attendees will understand INCLUDES, its mission, its goals, its structure, and related theories of action needed for success in broadening participation in STEM
- Presenters: Monya Ruffin, Caitlin Dooley, Bob Russell
- Guiding Questions: What are NSF priorities and needs from the field in order for INCLUDES to successfully demonstrate impact in broadening participation in STEM? How can ITEST and INCLUDES pilot/workshop projects connect and align in mutually beneficial and impactful ways? What are implications of future Alliances and Backbone Networks on this community of practice?

#### Day 2: Student engagement and teacher PD in ITEST: Successful, inclusive strategies and lessons learned

- Goal: Attendees will articulate successful, innovative strategies and models for STEM engagement and teacher PD with specific populations of youth emerging from the ITEST community of practice
- Presentations: Closing the achievement gap & diversifying the STEM workforce (*Dr. Julia Clark*); student engagement (*Javed Khan & Chadia Affane Aji, Kimberly Scott, Jacob Martinez*); teacher PD (*Kathryn Guimond, David Reider, Berri Jacque*)
- Guiding questions: **Student engagement:** What specific, innovative strategies have been successful with specific populations of youth and why? How do innovations in project designs address traditional barriers to participation? What kinds of data sources, strategies and measures are projects employing to determine successful outcomes? How are projects engaging youth in innovative workforce development activities beyond the 'typical'? **Teacher PD:** How is innovative teacher PD occurring in projects serving specific populations of youth being translated into practice? How do projects address teacher self-efficacy issues around new pedagogy? What supports/scaffolding are needed to maximize outcomes? What pedagogical approaches and content, that may limit traditional/rote learning, can teachers apply to actively engage students with concepts and applications of STEM?

### **Strand 3. Work at the frontier: Preparing students for the future STEM workplace**

#### *Ballroom B*

Technological advances are driving changes in the workplace. Although the future of work is unclear, the National Science Foundation asserts that artificial intelligence, the Internet of Things, robotics and machine learning are driving a new vision of the future where various technologies will be embedded around, on and in us; where humans shape technology and technology shapes human interaction; and where technologies collaborate with humans. What characterizes work at this frontier? What skills will members of the workforce need in order to succeed in this new workspace? This strand will explore current efforts to answer these questions, review/discuss a framework of foundational STEM Career Competencies that can help prepare learners for success at this new frontier, and share ITEST examples that support these new directions. Participants will plan next steps to answer research questions emerging from these discussions and actions needed to raise the visibility of ITEST's role in preparing K-12 students with the foundational skills needed to pursue STEM careers at this new frontier.

#### Day 1: Defining the work at the human-technology frontier

- Goal: Attendees will hear diverse perspectives about work at the human-technology frontier and from ITEST projects about their work as it relates to the frontier
- Panelists: Amy Baylor, David Blustein, Joyce Malyn-Smith; Moderator: Chadia A. Aji
- ITEST Project Presenters: Kathryn Guimond, Dagen Valentine, Alexander Repenning
- Guiding Questions: How are we defining work at the human-technology frontier? What jobs/technologies? What internship or apprenticeship models exist/can be created to support skill development of youth at the K-12 level?

#### Day 2: STEM career competencies at the human-technology frontier

- Goal: Attendees will elaborate skills and competencies needed for work at the human-technology frontier and will discuss needs/challenges when designing ITEST projects at this intersection
- Presenter: Joyce Malyn-Smith
- Working Session: ITEST working groups about the frontier. Facilitators: Joyce Malyn-Smith, Kathryn Guimond, Bernadette Sibuma
- Guiding Questions: What skills should employees who work at the human-technology frontier have? How are ITEST projects already engaged in preparing K-12 students/youth with the foundational skills needed to pursue STEM careers in the frontier?

## **Strand 4: Big data: ITEST's role in developing career pathways and data literacy skills**

### *Ballroom A*

Big data are everywhere, and data science turns raw data into understanding, insight, and knowledge. Yet, data science skills (planning, collecting, evaluating, analyzing, interpreting) are often omitted from K-12 science programs. That, soon, will change. New expectations for science instruction emphasize that students should engage in the authentic practices of scientists, including data analysis and interpretation. Students should tackle meaningful and relevant problems of the 21st century, using real world data and authentic analytic tools. This strand will examine how ITEST projects are incorporating big data science skills to help students be successful in the 21st century. The group will also examine challenges and opportunities around using big data with youth.

In session one, we will hear from several ITEST research projects in which big data plays a central role in the educational model, highlighting common issues of data authenticity, student motivation, relevance, and other key challenges. In session two we will take stock of the varied approaches being used by ITEST projects and others to constructively engage students in big data as we begin to assemble a working definition of best practices and a list of effective software tools and curricular resources.

#### Day 1: Big data in ITEST projects: Examples, frameworks, challenges, opportunities

- Goal: Attendees will understand the context, discuss theoretical frameworks, and pose challenges about using big data in ITEST projects
- Presenters: Ardice Hartry (facilitator), John Cherniavsky (NSF Senior Advisor for Research), Sam Janis, Alex Gurn, Catherine Cramer, Janet Roveda, Stephen Koury
- Guiding questions: What does it mean to authentically interact with data? What are limiting and encouraging factors that contribute to students' likelihood to engage with data?

#### Day 2: Best practices when using big data with teachers and youth

- Goal: Attendees will identify best practices for ITEST projects using big data with youth
- Facilitator: Sam Janis
- Guiding questions: What are best practices in using big data in ITEST projects? What do we know? What do we need to know?



## ITEST Project Expo

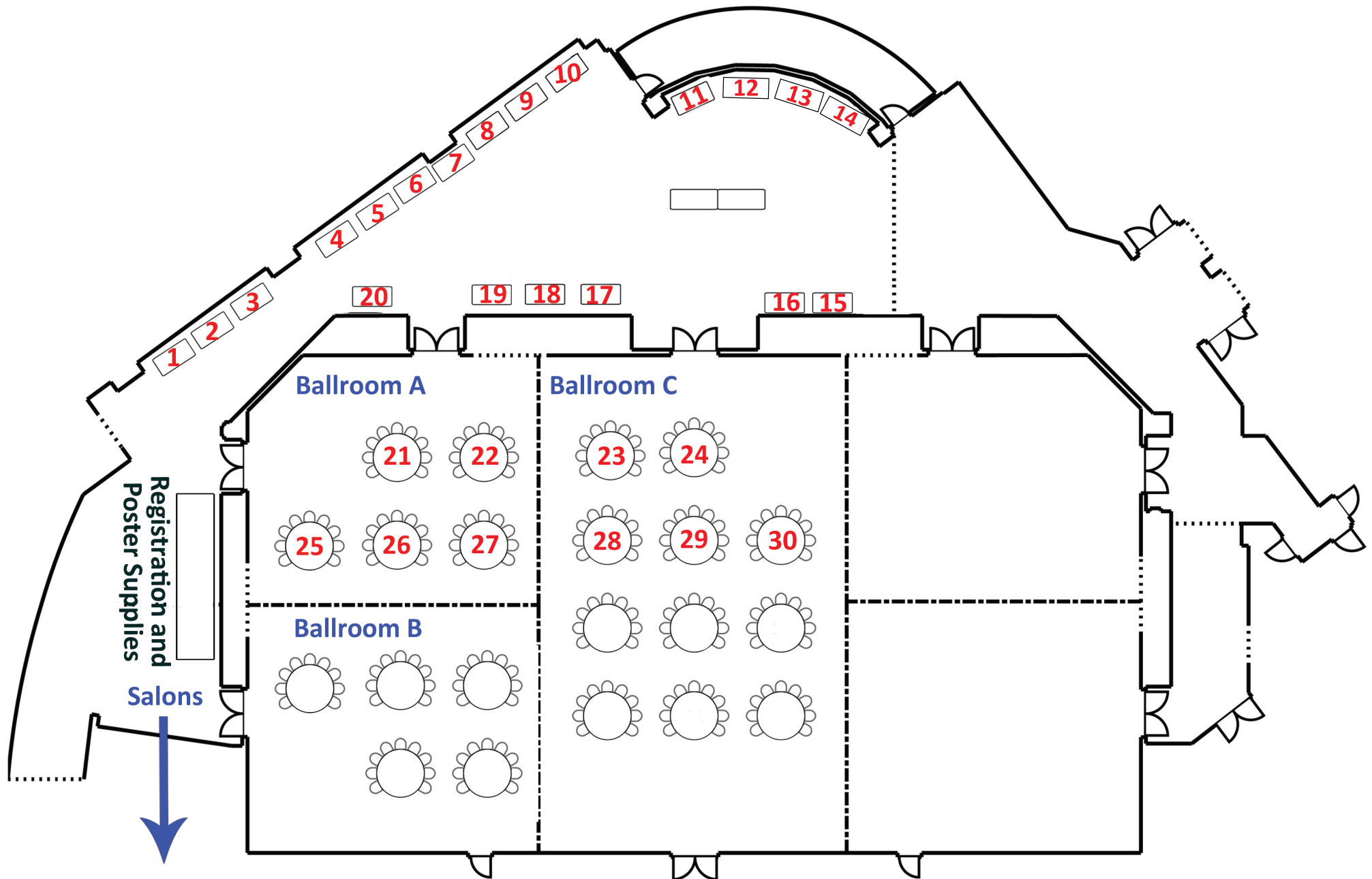
During the ITEST Project Expo, participants can explore different project stations to experience demonstrations, interactives, posters, videos, and/or artifacts from project work. The expo will feature the following projects and presenters, see map on the following page for station locations.

1. **CSI: Classroom Student Investigations**  
*Karen Yanowitz, Arkansas State University*
2. **Marine Technology for Teachers and Students (MaTTS)**  
*Ivar Babb, University of Connecticut*
3. **The Eyes Say it All: Using web page design and eye-tracking technology to learn STEM concepts, research skills, and human factors**  
*Marcia Rossi, Alabama State University*
- 4.\* **Going Green! Middle Schoolers Out to Save the World**  
*Rhonda Christensen & Gerald Knezek, University of North Texas*
5. **SISTERS: Sustaining Interest in Science, Technology, Engineering, & Research in Society**  
*Mandy Bratton & Leanne Jacobson, University of California, San Diego*
6. **Nebraska Wearable Technologies Project WearTec**  
*Dagen Valentine, University of Nebraska-Lincoln 4-H Extension*
- 7.\* **Making the Maker: A Pathway to STEM for Elementary School Students**  
*Francis Quek, Texas A&M University*
8. **Science, Technology and Engineering Mini-business Incubator (STEM-Inc)**  
*Jidong Huang, California State University, Fullerton*
9. **iDigFossils: Engaging K-12 Students in Integrated STEM via 3D Digitization, Printing and Exploration of Fossils**  
*Pasha Antonenko, University of Florida*
- 10.\* **ITEAMS II: Innovative Technology-Enabled Astronomy for Middle Schools ("YouthAstroNet")**  
*Mary Dussault, Harvard-Smithsonian Center for Astrophysics*
- 11.\* **American Innovations in an Age of Discovery**  
*Glen Bull, Curry School of Education & James Rutter, Make to Learn Laboratory, University of Virginia*
12. **iSTEM-Innovative Science, Technology, Engineering and Mathematics Strategy Project: Encouraging STEM Careers through Innovation**  
*Cynthia Trawick, Willie Rockward, Tiffany Bussey, Jamie Clayton, Morehouse College & Melissa Demetrikopoulos, Institute for Biomedical Philosophy*
13. **SciGirls Strategies: Gender Equitable Teaching Practices in Career and Technical Education Pathways for High School Girls**  
*Rita Karl, Twin Cities PBS*

\* Denotes Technology Demonstration

- 14.\* **GeniConnect: Game-based learning, mentoring and laboratory experiences—a model for industry/ afterschool partnerships**  
*Frieda Reichsman, The Concord Consortium*
- 15.\* **Model-BEST**  
*Bob Coulter, Missouri Botanical Garden*
- 16.\* **Promoting Robotic Design and Entrepreneurship Experiences among Students and Teachers**  
*Vikram Kapila, NYU Tandon School of Engineering*
17. **Collaborative Digital Bioscience Career Awareness Curriculum and Teacher Professional Development**  
*Berri Jacque, Tufts University School of Medicine*
18. **Broadening Interest in Geoscience, Habitat, and Technology (BRIGHT Girls)**  
*Laura Conner, University of Alaska Fairbanks*
- 19.\* **Next Step Learning**  
*Joyce Massicotte, The Concord Consortium*
20. **Authentic art making as a vehicle for connecting to STEM learning and careers**  
*Lynn Goldsmith, Education Development Center, Inc.*
- 21.\* **Designing Tactile Picture Books: Critical Making in Libraries to Broaden Participation in STEM**  
*Stacey Forsyth, Heather Thiry & Tom Yeh, University of Colorado Boulder*
22. **The Youth Digital Storytelling STEM Academy**  
*Eugene Cordero, San Jose State University*
23. **Promoting STEM Interests and Careers through Families and Museums Exploring**  
*M. Gail Jones, NC State University*
24. **The IT College and CAREERS Readiness Project: Career Academy Research on Educational Experiences and Related Successes**  
*Edward Fletcher and Victor Hernandez, University of South Florida & Thomas Horwood, ICF*
25. **Soft Robotics to Broaden the STEM Pipeline**  
*Anita Deck, International Technology and Engineering Educators Association & Nathan Mentzer, Purdue University*
26. **Opportunities to Learn: Creative Science Inquiry, a Middle Grades Teaming Framework**  
*Dana Franz, Mississippi State University*
27. **Inspiring Commitment for STEM Career Paths through Extended Women's Hackathons**  
*Youwen Ouyang & Donald Baltazar, California State University, San Marcos*
28. **Building Unique Inventions to Launch Discoveries, Engagement and Reasoning in STEM (BUILDERS)**  
*Martha Escobar, Oakland University, Department of Psychology*
29. **Researching a School District's Integration of the Maker Movement into its Middle and High School**  
*Keith Trahan, University of Pittsburgh, Collaborative for Evaluation and Assessment Capacity*
30. **Engaging Secondary Students in Regionally Relevant Science Topics through Videography**  
*Megan Littrell-Baez, Cooperative Institute for Research in Environmental Sciences*

# ITEST Project Expo Map



## Keynote Panel

### Career development theory: From theory to practice in ITEST projects

This panel is an opportunity to learn more about career development theory and then hear how ITEST projects have implemented theory into their work. David Blustein will present an overview of the most recent developments in career development theory. This will be followed by two ITEST project PIs, each of whom has used (different) theories in different ways to promote career interest among participants. The panel will be facilitated by Joyce Malyn-Smith, who will highlight connections between career development theory and ITEST practices. By the end of the panel, audience members should have new ideas for thinking about career development in their projects as well as examples of moving from theory to practice in ITEST.

#### Presenters:

**David Blustein**, Professor, Boston College

**Kimberly Scott**, Associate Professor, Arizona State University

PI of *COMPUGIRLS: A Culturally Relevant Technology Program for Girls* and *COMPUGIRLS Scale-Up*

**Eli Tucker-Raymond**, Research Scientist, TERC

PI of *Conference on Literacies in Engineering for Access and Participation* and Co-PI of *Bridging Math Literacy and Digital Media Creation: Students as Learners, Teachers, and Leaders of STEM Content*

**Joyce Malyn-Smith**, Managing Project Director, Education Development Center, Inc.

Senior advisor to the *STELAR Center*