2020 Virtual Conference on Transforming STEM Higher Education:

THIS Changes Everything

November 5-7, 2020
Dear Friends,

Welcome to the 2020 AAC&U STEM Conference!

When last we met, we had just experienced one of the most inspirational keynote addresses the STEM Conference has ever seen – calling us to blend our love for STEM, our leadership of change, and our souls’ deepest desires into our work. With it, we were set on a new and exciting course. Yet, as I write, we are two weeks away from a pivotal election in our country. We are eight months into a pandemic. We are reeling from rising racial tensions. We are isolated. We are under executive order to cease diversity training. We are stretched. We are in need of leadership. We are burned out.

Indeed, this changes everything for us!

But, we cannot forget the lessons of last year’s conference. We are no strangers to change. And we cannot forget the words of the songwriter...

There are not many things
In life you can be sure of.

Except
Rain comes from the clouds,
And sun lights up the sky,
And humming birds do fly.

We must remember that there are, and should always be, exceptions to change in undergraduate STEM reform – like conferences calling us to action and community tying us together. This AAC&U STEM Conference provides us with both – even through a virtual space. Of course, we will engage with you in dialogue, discourse, and dissemination. But this time, we will also embrace the uncertainty with you, build our collective resolve with you, and begin to heal the hurts that racial unrest, COVID-19, isolation, and political divides have hurled at us. It is a new charge for this conference – a responsibility that we haven’t taken lightly.

To that end, we invite you to take full advantage of our virtual keynote, concurrent, and poster sessions. And we hope you will also enjoy the virtual conference “extras” – from the mindfulness meditation moments to the STEM Central Lobby – all of which have been scheduled and designed to maximize your conference experience and bring us closer into community with each other.

Again, welcome to the AAC&U STEM Conference. We are so proud and humbled to have you join us for as much of the conference as your schedule will allow. If there is anything that we can do to make your experience a better one, please, don’t hesitate to let us know.

Sincerely,

Vice President for Undergraduate STEM Education; and
Executive Director, Project Kaleidoscope
CONFERENCE SPONSOR

AAC&U thanks the following sponsor for their generous support of this conference.

*Google Cloud* helps power new possibilities in education. From powering higher education research and infrastructure to providing better support across the student journey with analytics and AI tools, our Cloud solutions, teaching tools, and affordable devices help transform classrooms and campuses. Explore how Google solutions are supporting breakthrough discoveries and empowering educators to improve learning experiences at [edu.google.com/programs](http://edu.google.com/programs).
CONFERENCE REVIEWERS

The entire staff of AAC&U acknowledges and thanks the following individuals for their national service as Conference Reviewers for the 2020 AAC&U STEM Conference.

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ABOUT THE VIRTUAL FORMAT

AAC&U, in collaboration with the Forum on Education Abroad, is pleased to host its virtual STEM Conference through the vConference Online platform. This platform uses Zoom technologies to create a seamless and meaningful virtual conference experience.

Registrants receive conference login credentials prior to the conference. Any registrant who has not received login information prior to the start of the conference, should email conference@forumea.org. On the day of the conference, please follow the link provided with login information and select “Enter Event.” Sessions will begin promptly at the session start time. To locate a session, select “Session Lobby” and locate the room as indicated in the program of events. Select the button labelled “Zoom” to join the session.

If there are any technical difficulties during the conference, please use the vConference Online Help Center, accessible via the Conference Lobby and navigation menu bar or email info@vconferenceonline.com.

UPCOMING CONFERENCES

2021 AAC&U Annual Meeting: Revolutionizing Higher Education After COVID-19
January 20-23, 2021

General Education, Pedagogy, and Assessment
February 11-13, 2021

Diversity, Equity, and Student Success
March 25-27, 2021

Global Learning
October 7-9, 2021

Transforming STEM Higher Education
November 4–6, 2021
SCHEDULE AT A GLANCE

All times listed are Eastern Time.

MONDAY, NOVEMBER 2
2:00 pm – 5:00 pm  Pre-Conference Workshop 1: Decoding the Disciplines: Helping Students Succeed in STEM Courses*

TUESDAY, NOVEMBER 3
2:30 pm – 5:30 pm  Pre-Conference Workshop 2: Democratizing STEM Higher Education Through Contemplative Practices*

WEDNESDAY, NOVEMBER 4
2:00 pm – 5:00 pm  Pre-Conference Workshop 3: Experience the Difference: A Virtual Approach to Leadership Development*

THURSDAY, NOVEMBER 5
9:00 am – 9:30 am  Morning Mindfulness Meditation
9:45 am – 10:15 am  Concurrent Sessions
10:30 am – 11:30 am  Concurrent Sessions
11:45 am – 12:30 pm  AAC&U Newcomers Welcome
1:45 pm – 2:15 pm  Concurrent Sessions
2:30 pm – 3:00 pm  Concurrent Sessions
3:15 pm – 3:45 pm  Concurrent Sessions
4:00 pm – 5:30 pm  Conference Welcome and Keynote Address

Executive Orders
David J. Asai, Howard Hughes Medical Institute

FRIDAY, NOVEMBER 6
9:00 am – 9:30 am  Morning Mindfulness Meditation
9:30 am – 10:00 am  Concurrent Sessions
10:15 am – 11:15 am  STEM Central Lobby (Live Chat Rooms)
11:30 am – 12:30 pm  Keynote Address

Powerful Leadership: Strategies for Impact in a Chaotic World
Joan V. Gallos, Wheelock College

1:30 pm – 2:00 pm  Midday Mindfulness Meditation
2:00 pm – 3:00 pm  Concurrent Sessions
3:15 pm – 4:15 pm  Concurrent Sessions
4:30 pm – 5:30 pm  Poster Session
6:00 pm – 7:00 pm  STEM Central Lobby (Live Chat Rooms)

SATURDAY, NOVEMBER 7
9:00 am – 9:30 am  Morning Mindfulness Meditation
9:45 am – 10:45 am  Concurrent Sessions
11:00 am – 12:30 pm  Closing Keynote

Cultivating the Imprint in Your Soul
Sharon L. Fries-Britt, University of Maryland, College Park

All times listed are Eastern Time.
*Separate registration and fee required.
PRE-CONFERENCE WORKSHOPS

Pre-conference Workshops are an opportunity to vigorously engage in a topic integral to the themes of the conference. The workshops will be highly interactive and grounded in principles of engaged learning. Registration and an additional fee are required. Registered participants will receive login information for the workshop by email.

MONDAY, NOVEMBER 2, 2020, 2:00-5:00 PM

**Workshop 1: Decoding the Disciplines: Helping Students Succeed in STEM Courses**

The disruption of K-12 education by COVID-19 will produce a generation of college students with major skills deficits that will be felt most strongly among low income and minority students in STEM courses. Decoding the Disciplines (Decoding) provides a strategic framework for systematically addressing this challenge. Beginning by identifying bottlenecks to learning in particular courses, Decoding uses an interview process to make explicit the steps that students must master to get past these obstacles and then systematically teaches these to students (see [http://decodingthedisciplines.org/](http://decodingthedisciplines.org/)). Participants in this workshop will be introduced to Decoding, see examples of its application to topics such as interpreting verbal statements in mathematics problems and understanding graphs in various STEM disciplines, and apply the process to a bottleneck from their own courses.

*Leslie Cameron,* Professor of Psychology—Carthage College; *David Pace,* Professor Emeritus of History—Indiana University Bloomington; and *Peter Riegler,* Professor of Computer Science—Ostfalia Hochschule fur angewandte Wissenschaften

TUESDAY, NOVEMBER 3, 2020, 2:30-5:30 PM

**Workshop 2: Democratizing STEM Higher Education through Contemplative Practices**

Contemplative practices allow individuals to gain a deeper understanding of themselves, others, and their context by integrating body and mind. These practices create learning environments that are authentic, purposeful, holistic, and inclusive, but are underutilized in STEM curricula. This workshop provides an immersive introduction to contemplative practices to support STEM educators in creating learning environments that leverage mindful, affective, and embodied ways of knowing. Participants will engage with a toolkit of contemplative practices, including sensory and visual meditation, deep listening, beholding, contemplative movement, and critical reflection, which will equip them to reimagine how they promote students’ capacity for self-awareness and reflection in their own learning contexts. These strategies allow the co-creation of environments that are inclusive of all ways of knowing and being.

*Madhvi J. Venkatesh,* Lecturer and Associate Director of Graduate Education, Department of Biological Chemistry and Molecular Pharmacology—Harvard Medical School; and *Yevgeniya V. Zastavker,* Professor of Physics and Education—Franklin W. Olin College of Engineering

WEDNESDAY, NOVEMBER 4, 2020, 2:00-5:00 PM

**Workshop 3: Experience the Difference: A Virtual Approach to Leadership Development**

PKAL has over thirty years of experience transforming STEM education, including success providing effective leadership development through the STEM Leadership Institute (SLI). Nearly 60% of the SLI’s curriculum is grounded in experiential learning using Kolb’s Experiential Learning Cycle. Join PKAL SLI leaders and mentors in experiential learning exercises (ELEs) designed for a virtual environment to develop leaders of inclusive and systemic change in STEM higher education. This interactive session uses ELEs to engage participants and help them experience and understand how an ELE can be used in a virtual format to explore various aspects of leadership, team building, and inclusivity. This workshop will enhance your ability to use virtual experiential learning approaches to develop leadership capacity in others, encouraging participation of all in STEM fields.

*William B. Davis,* Associate Dean for Undergraduate Education—Washington State University; *Allison Leone,* Director, Tucker Leadership Lab—William Jewell College; *Mary Majerus,* Professor of Mathematics—Westminster College; and *Brandon E. Schwab,* Associate Provost for Academic Affairs—Western Carolina University
9:00 a.m. – 9:30 a.m. ET
Mindfulness Session

BALLROOM

9:45 a.m. – 10:15 a.m. ET
Concurrent Sessions

ALBANY ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Active Learning, Assessment, Professional Development

CS-1  Mastery Based Testing and Self-Reflection

Students’ perception/acceptance of Mastery Based Testing (MBT) may vary widely as a result of the motivation for taking a course: pre-requisite course versus required course. Having implemented Mastery Based Testing in several courses over several semesters, there is a clear delineation between the majors and non-majors perception and acceptance of this grading scheme. The data collected provided important information to guide the modification of the implementation of Mastery Based Testing in follow-on semesters. Going forward, requiring students to complete self-reflection grading on all assessments in a mastery based testing course may be the mechanism needed for students to close the gap in their understanding and mastery of concepts. Self-reflection grading may be the catalyst for a broader acceptance of the assessment scheme.

Denise Krueger, Associate Professor—Mount St Joseph University

15 ppt decrease in DFW grades, and 12 ppt increase in student persistence to the following semester, and is amenable to all class sizes and delivery modes.

Doug McElroy, Professor of Biology—Western Kentucky University

BENEDICT ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Active Learning, Interdisciplinarity, Leadership

CS-2  Interleaved Practice, F&P Concepts, and Student Success in Gen Ed Biology

Non-majors Biology is often among the most highly enrolled general education courses. At WKU, 900+ students enroll annually, in sections of 30-230 students taught both face-to-face and online. Most students are FTFY, and all are non-science majors. Historically, this course has carried a DFW rate of 30-35%. Since Fall 2019, I have used an interleaved practice teaching approach focused on reinforcing the scientific process as a key learning objective. To further facilitate student learning, I organize each chunk of content around 3-4 Fundamental and Powerful Concepts (Nosich 2009). This twin approach has led to a statistically significant 15 ppt decrease in DFW grades, and 12 ppt increase in student persistence to the following semester, and is amenable to all class sizes and delivery modes.

Doug McElroy, Professor of Biology—Western Kentucky University

BOWIE ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Active Learning, Interdisciplinarity, Leadership

CS-3  Flipped EQ: Utilizing Design-Based Learning Experiences to Teach EQ

This qualitative research study explored the use of design-based experiences along with reflection and story making as an instructional strategy for supporting learners to gain awareness of their social and emotional intelligence and their transversal skills that were enacted during short engineering design-based experiences. Team-based experiences were used to explore the potential of using design-based activities as an instructional tool for addressing social and emotional learning. By placing an intervention (reflection or interview) focused on the social and emotional, as well as other transversal skills utilized during the experience, the learners found they were able to explore and take-away more than just evaluating their achievement with the outcome of the final product.

Michele Norton, Post-Doctoral Researcher—Texas A&M University; Ben Zoghi, Victor H. Thompson Professor, Director of Masters of Engineering Technical Management—Texas A&M University

CLARK ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Broadening Participation, Historically Black Colleges and Universities (HBCU), Virtual Learning

CS-4  A Culturally Responsive Approach to Conducting Virtual Research

The proposed innovation/ideation session will present a phenomenological perspective of conducting virtual STEM research, in a culturally responsive way at an HBCU. The project examines the development and execution of a virtual STEM research experience between a graduate student and staff member amid the sudden shift toward virtual learning. Careful examination of the existing structures and practices within this investigation will inform the components of a developing “culturally-responsive STEM mentoring” model, relevant to HBCUs. As a result of
this session, approaches/guidelines will be generated to facilitate and replicate cultural responsiveness in STEM virtual research experiences. Broader outcomes of this work may inform efforts to prepare traditionally marginalized STEM students to enter tomorrow’s STEM workforce.

Amy Salter, Research Associate—Morehouse College; Manisha Maurya, Graduate Research Assistant—Morehouse College

CS-5 Sharing our High-Achievers S-STEM Program
A study performed by the U.S. Department of Education found that 48 percent of STEM students seeking a bachelor’s degree left those programs within 6 years. Researchers have suggested a variety of reasons for leaving STEM majors including poor performance in early STEM classes and social aspects such as a lack of a sense of belonging. Our High Achievers S-STEM program, established in Fall 2018, addresses both the academic and social needs of STEM students. The research clusters, study halls, alumni mentoring, leadership workshops, and S-STEM seminar allow students to become engaged as freshmen in activities that increase their confidence, skills, and sense of community. These activities have been successful in retaining 91% of the students (45% non-white) in the program.

Rahman Tashakkori, Lowe’s Distinguished Professor—Appalachian State University; Cindy Norris, Professor—Appalachian State University

CS-6 Navigating Interdisciplinary Identity in Undergraduate Programs
The Integrated Concentration in Science (iCons) at UMass Amherst provides undergraduate students an opportunity to investigate complex, real-world scientific problems while working in collaborative teams. Emergent findings related to program outcomes highlight its capacity to develop students’ identities as scientists and interdisciplinarians. In this session, we will use emerging findings from exploratory qualitative research to show how iCons prepares students to navigate tensions between disciplinary cultures and interdisciplinary problems. Our findings highlight the importance of intrinsic student motivations, a focus on “the problem” as an entry point for both scientific inquiry and interdisciplinary science, and a developmental trajectory in interdisciplinary identity and practice.

Genia Bettencourt, Postdoctoral Research Affiliate—University of Southern California; Scott Auerbach, Professor of Chemistry; Executive Director of iCons—University of Massachusetts Amherst; Justin Fermann, Program Director of iCons—University of Massachusetts Amherst; Ryan Wells, Director, Center for Student Success Research; Professor of Education—University of Massachusetts Amherst; Ezekiel Kimball, Associate Professor of Education; Associate Director of Center for Student Success Research—University of Massachusetts Amherst

CS-7 How the UNC System’s Course-Specific OER Resources Support Math Pathways
How a large public university system in North Carolina with 17 constituent institutions harnessed the energy, expertise, and collegiality supporting their recent Math Pathways effort to launch an extensive open repository for general education STEM courses of over 7500 resources and 152 modules supporting 13 course areas with almost 100 faculty and staff in just five weeks. Course collections include: Calculus, Statistics, Quantitative Reasoning, Biology, Chemistry, and Anatomy & Physiology. Templates, processes, the actual repository, resources, lessons learned, and diversity and inclusion modules will be shared.

Michelle Soler, Director of Competency Based Education and Assessment—UNC System Office; Thomas Redd, Associate Professor of Mathematics—North Carolina A&T State University; Tracey Howell, Director, Math Help Center and Math Emporium Lab, Associate Director of Research and Instruction in the STEM Education Network—University of North Carolina at Greensboro; Tamar Avineri, Mathematics Instructor—North Carolina School of Science and Mathematics

CS-8 All Aboard: Gaining STEAM in the Health Sciences
This panel, comprised of clinical, health sciences, and humanities faculty, will discuss measures taken to emphasize and strengthen writing and communication at the undergraduate and graduate levels of several health sciences programs. The data and feedback received from these efforts can develop future plans for further integration of the humanities into STEM programs. Topics of discussion will include core writing instruction, course
development, writing support, clinical program engagement, and expansion of health humanities initiatives.

**Courtney Watson**, Associate Professor of English—Radford University Carilion; **Sallie Beth Johnson**, Associate Professor and Chair, Public Health & Healthcare Leadership—Radford University Carilion; **Amy Rubens**, Associate Professor and Interim Associate Dean, College of Graduate Studies and Research—Radford University; **Milena Staykova**, Professor, MSN FNP Program Coordinator—Radford University Carilion

**LINCOLN ROOM**

### INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

**CS-9**  **Realistic Transfer Pathways: Redefining the Concept of an Associate Degree**

Traditional associate degrees require completion of all lower division general education requirements, often at the expense of prerequisite courses that allow students to advance in their majors upon transfer. To address this problem, the SLCC Biology Department, in partnership with our major transfer institution, the University of Utah, created a program leading to an Associate of Pre-Science (APS) degree where some general education courses are deferred post-transfer. The goal of the APS degree is to increase equity in completion rates by providing a clear transfer pathway that allows students the credit flexibility to take needed preparatory courses. Creation of the degree required significant work to reframe the idea of what it means for a student to complete their education at a community college.

**Jessica Berryman**, Associate Professor of Biology—Salt Lake Community College; **Tim Beagley**, Professor of Biology—Salt Lake Community College; **Holly Godsey**, Director of Student Success & Teacher Development, Center for Science and Mathematics Education—University of Utah; **Craig Caldwell**, Dean of the School of Science, Mathematics, and Engineering—Salt Lake Community College

**JACKSON ROOM**

### INNOVATION/IDEATION SESSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS

**CS-10**  **Centering Identity: Design of an Inclusive Teaching Course for STEM Faculty**

The key to creating and sustaining inclusive learning environments is for educators to have an awareness of how student and instructor identities, intersect with historical and contemporary systems (and dominant narratives) that yield experiences or opportunities that disadvantage some and advantage others. This disparity is especially important now as instructors are becoming increasingly aware of how one’s teaching practices may expand upon or inhibit their students’ sense of belonging in the classroom environment. In this interactive session, we will describe how we centered identity in the affinity spaces, local learning communities and inclusivity framework portfolio of our Inclusive STEM Teaching Project, and through community reflection, explore how these approaches can work in multiple contexts.

**Veronica Womach**, Project Manager of Inclusive Learning—Northwestern University; **Tazin Daniels**, Assistant Director of the Center for Research, Learning, and Teaching—University of Michigan Ann Arbor; **Tershia Pinder-Grover**, Director of the Center for Research on Learning and Teaching in Engineering—University of Michigan Ann Arbor; **Susanna Calkins**, Interim Director of the Searle Center for Advancing Teaching and Learning—Northwestern University; **Robin Greenler**, Assistant Director of the Center for the Integration of Research, Teaching, and Learning (CIRTL)—University of Wisconsin Madison; **Bennett Goldberg**, Director of Research in Higher Education, Training, and Evaluation—Northwestern University

**JARVIS ROOM**

### INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

**CS-11**  **Refining the Self-Efficacy as Faculty Change Agent for Diversity Scale**

A technical report, published July, 2020, provided an overview of the development of the Self-Efficacy as Faculty Change Agent for Diversity (SE-FCA-D) scale (Maccalla, et al.). The 5-item scale currently appears as an additional module on the Higher Education and Research Institute (HERI) Faculty Survey 2019-2020 for the Building Infrastructure Leading to Diversity (BUILD) programs within the Enhance Diversity Study. The NIH supported initiative (NIH U54GM119024) aims to increase underrepresented groups in the biomedical sciences, through institutional, faculty, and student development interventions. The piloted scale is meant to measure DPC Hallmark of Success FAC-16: “Strong self-efficacy to act as a change agent to enhance diversity in biomedical research and research training environments” (DPC, 2019). Authors are interested in collaborative opportunities to further refine the scale.

**Nicole Maccalla**, Lead Investigator of the Enhance Diversity Study—University of California Los Angeles; **Cynthia Joseph**, Director of Communications and Dissemination Core, Coordination and Evaluation Center—University of California Los Angeles; **Dawn Purnell**, Staff Researcher—UCLA; **Shujin Zhong**, Graduate Student Researcher—UCLA
FACILITATED DISCUSSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

**CS-12** Research Readiness: Evolving STEM with Innovative Team Based Active Learning

We embedded in-class collaborative assignments that develop professional and life design skills into two courses focused on preparing students for research and alternate science careers. Students in our courses work in a team-based setting to develop their own research goals, and through mentorship are encouraged to realize them through collaborative research. Thus, they develop skills that empower them to be adaptable to change and to engage in life-long learning. Our teaching model helps diversify the scientific workforce and makes our students aware of options, including careers in innovation and entrepreneurship. In this session, we will present our teaching model and encourage participants to discuss the barriers that prevent their students from pursuing scientific careers, along with successful approaches to overcome these barriers.

**Michelle Arnot**, Associate Professor, Teaching; **Associate Chair Undergraduate Education**,—University of Toronto; **Stavroula Andreopoulos**, Associate Professor of Teaching—University of Toronto; **Michelle French**, Associate Professor of Teaching Stream and Vice Chair (Undergraduate) and Special Advisor to the Dean of Medicine on Innovation in Undergraduate Education—University of Toronto; **Rebecca Laposo**, Assistant Professor of Teaching—University of Toronto; **Helen Miliotis**, Assistant Professor of Teaching—University of Toronto

**CS-13** Creating Successful STEM Living Learning Communities

The phrase “it takes a village” could not be more accurate when describing the creation of a successful STEM Living Learning Community. Faculty, student affairs, academic staff and student leaders all play a role in building an engaging, intentional community for residential STEM scholars. Agnes Scott College has seen several iterations of living learning communities on campus over the years. In this session participants will gain insight into building a successful STEM LLC and learn creative and effective ways to engage residents. Participants will also discuss methods to successfully collaborate key members across campus to provide diverse engagement approaches.

**Daisy Bourassa**, Associate Director of Residential Education and Chemistry Instructor—Agnes Scott College; **LaShandra Owens**, Director of Math and Science Resource Center—Agnes Scott College; **Mihika Rao**, Undergraduate Student—Agnes Scott College

**CS-14** A First-Year Course for STEM Success: Helping Students Build Their Science

Stanislaus State’s STEM Success grant funds a variety of activities to help retain students in STEM. One of these is NSCI 1000, a first-semester course that helps incoming STEM majors develop a sense of belonging to the university in general and to STEM in particular. The course also provides students fundamental skills that allow them to engage in research with faculty. Attend this session to learn about NSCI 1000 and the features it shares with first-year experience courses, as well as unique features that are tailored specifically to STEM majors. We’ll review quantitative and qualitative data that demonstrate the course’s efficacy, and engage in a lively discussion about how best to reproduce these outcomes at other institutions.

**Harold Stanislaw**, Professor of Psychology and STEM Success Evaluator—California State University, Stanislaus

**CS-15** Engaging A Network of Groups to Enhance Cohort Program Effectiveness

Student cohorts are effective in increasing the sense of belonging and academic success of their members. These programs also have the potential to integrate other campus collaborators to form a more comprehensive and inclusive campus climate for students. In this session we will explore approaches that have been used at our institution to understand how to identify and leverage these groups to enhance support and inclusion beyond the cohort members themselves. We will share what we have learned about campus supports from recent alumni who provide retrospective insights and another form of connection for cohort students. Participants will identify and discuss how to gather data to leverage supportive groups on their campus and strengthen campus inclusion capacity.
Transformative cultural change in science education requires interventions on multiple levels. Specific goals must be determined. Institutional pressure points to meet these goals must be identified and addressed, subsequently, by institution-appropriate interventions. In this guided discussion, we share the approaches and outcomes of a six-year (and ongoing) NIH-supported program to foster a strong culture of research, ranging from lower division undergraduates to faculty, at an HBCU. We demonstrate the impact our program has had at our institution on various levels. We will encourage participants to engage in an analysis of pressure points for goal-directed change at their own institutions and to consider if some of the models used at our university could be of use in their specific institutional settings.

Christine Hohmann, Professor—Morgan State University; Shiva Mehraravan, Lead Evaluator—Morgan State University; Payam Sheikhattari, Professor—Morgan State University; Gillian Silver, Associate Director for Administration, ASCEND & RCMI—Morgan State University; Jocelyn Turner-Musa, Professor—Morgan State University; Cleo Hughes-Darden, Chairperson and Associate Professor—Morgan State University

The underrepresentation of women in STEM fields is a well-known concern. In the U.S., the undergraduate women’s STEM degree conferral rate is 35%. The participation rates in the corresponding majors remained virtually flat from 2000-2015 with the exception of Computer Science, which declined. A one-year pilot program, Stempower, achieved outstanding results with its first undergraduate cohort. The goal of the program is to retain women in their STEM majors and enable post-graduation career success. The collaboration between the University’s Career Development Office and the program leader, with significant industry experience, was a distinguishable success factor. Expansion of the program to a broad range of universities will have a positive impact on the number of women receiving STEM degrees and excelling in their professions.

Meredith Tornabene, Director of Career Advising & Development—Le Moyne College; Terri Mitchell, Founder & CEO—Accelerate Success

The NSF Improving Undergraduate STEM Education (IUSE) program focuses on improving the effectiveness of teaching and learning in STEM introductory courses for majors and non-majors to provide future leaders in dynamic and evolving STEM fields and a scientifically educated public. A five-year IUSE project at a large, public, research one institution, which currently involves two of four departments. Through professional development in-course communities of transformation (CCT) and cross-course communities involving faculty, graduate teaching assistants (GTAs), and undergraduate learning assistants (LAs), researchers expect active- and inquiry-based learning pedagogies to diffuse through the departments and across the university. This workshop session reports early findings from the current participating departments and cross-course community and provides a space for developing plans for implementing change at participants’ own institutions.

Julie Shank, Doctoral Candidate, Higher Education Program, Graduate Research Assistant—George Mason University; Kathryn Fernandez, Doctoral Student, Physics Education Research, Graduate Research Assistant—George Mason University

COVID has forced many of us onto online platforms, with a need to rethink how we measure student learning. How do we determine which approaches are the best fit with the outcomes we care most about, and how do we best use them? In this workshop, we will introduce a set of design principles collaboratively developed by faculty from ten campuses in response to the challenges of online assessment in STEM; use those principles to analyze actual
practices; and invite reflection on how they might apply to participants’ own courses and programs. You will leave with concrete ideas about introducing and applying these principles with colleagues at your home institution. This session is designed for STEM faculty, faculty developers, and assessment leaders.

Pat Hutchings, Senior Scholar—Bay View Alliance; Anthony Vartia, Assistant Teaching Professor—University of Kansas; Joshua Potter, Documenting Learning Specialist—University of Kansas; Kevin Yee, Assistant Dean, Teaching and Learning—University of South Florida

WORKSHOP | TYPE III: NATIONAL-LEVEL INTERVENTIONS

Keywords: Community College, Minority Serving Institution (MSI), Undergraduate Research

CS-20 Promoting STEM Research for Underrepresented Minority Community Colleges Students

During this session we will discuss undergraduate research at the community college level as an engagement and retention strategy for underrepresented minority (URM) STEM students. Come hear how the research mentors across three North Carolina Community Colleges guide the students through research and how their explorations went from journal reviews to hands on projects. We will share best practices, and results from engaging URM STEM students through National Science Foundation supported undergraduate research.

Amber Griffin, Project Manager—Central Piedmont Community College; Forrest Kidd, Instructor Engineering Transfer Associate in Engineering—Guilford Technical Community College; Carl Arrington Jr., Associate Professor, Application Development—Central Piedmont Community College

WORKSHOP | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Active Learning, Institutional Change/Transformation, Leadership

CS-21 Lessons Learned: Department Transformation of First-Year Math Courses

This workshop will offer attendees a chance to learn about and discuss key change levers for positively transforming departmental cultures to actively engage students. Grounded in research from the Student Engagement in Mathematics through an Institutional Network for Active Learning (SEMINAL) Project, mathematics departments sought to improve student outcomes in first-year courses through course coordination and active learning. Results from the SEMINAL project indicate that course coordination, commitment to educational innovation, leadership, professional development, and planning for sustainability are some of the key change levers utilized for departmental transformation. We hypothesize that these levers can be readily applied and adapted to other multi-section undergraduate courses.

Wendy Smith, Research Professor of Mathematics Education and Associate Director of the Center for Science, Mathematics and Computer Education—University of Nebraska-Lincoln; Antonio Martinez, Graduate Research Assistant—San Diego State University

11:45 a.m. – 12:30 p.m. ET
AAC&U Newcomers Welcome

BALLROOM

As the leading national association concerned with the quality, vitality, and public standing of undergraduate liberal education, AAC&U works closely with its member institutions to extend the advantages of a liberal education to all students, regardless of academic specialization, intended career, or the type of institution they attend. Participants will learn how AAC&U’s broad agenda for student learning—which focuses on quality, equity, inclusive excellence, student success, and integrative and global learning—and its signature Liberal Education and America’s Promise (LEAP) initiative together provide content, framework, and practical guidance for the undergraduate educational experience.

Lynn Pasquerella, President; Lorenzo Esters, Vice President for Advancement and Member Engagement; Kelly Mack, Vice President for Undergraduate STEM Education and Executive Director of Project Kaleidoscope; Stephenie Brooks-Maynard, Senior Director of Membership

1:45 p.m. – 2:15 p.m. ET
Concurrent Sessions

ALBANY ROOM

FACILITATED DISCUSSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Course-based Undergraduate Research, Undergraduate Research

CS-22 Challenges in Undergraduate STEM Research During the COVID-19 Pandemic

Undergraduate research has become a staple of many STEM departments. From working one-on-one with a faculty mentor in the lab to small group projects in class, students have engaged with undergraduate research in order to expand their knowledge as well as contribute to the greater science community, but all of this has changed since the COVID-19 outbreak. With the new social distancing and CDC guidelines, many research labs have had to limit the number of students working in them, expand on their current cleaning protocols, and, in some cases, move to entirely online research for undergraduate students. In this session,
we will be exploring the challenges associated with doing research during a pandemic as well as possible solutions for engaging students in undergraduate research.

Dereth Drake, Co-Coordinator of Undergraduate Research—Valdosta State University; A. Ligia Focsan Focsan, Associate Professor of Chemistry—Valdosta State University; Gopeekrishnan Sreenilayam, Assistant Professor of Chemistry—Valdosta State University

The National Science Foundation (NSF-IUSE) grant-funded project, known as Improving STEM Competency via Archaeological Research (ISCAR) examines the efficacy of using archaeological research to enhance undergraduate STEM competency. Further, ISCAR is particularly focused on those students from rural areas, low-income students, and/or first-generation, many of whom are from educationally disadvantaged schools. This paper examines the results of the first year of the project.

Brian Bates, Professor of Anthropology & Archaeology—Longwood University

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

CS-23 Providing Scholarships to Transfer Students Enrolled Less than Full-Time: A Silver Lining to Disruptions from COVID-19

Transfer students face different challenges and are an often-overlooked source of diversity in STEM. A microbiology program developed a hybrid online track for 2+2 transfer students that increased access and diversity in STEM. Need-based scholarships were awarded to transfer students in order to promote student success. However, full-time enrollment criteria posed a major barrier to awarding otherwise eligible students. Full-time enrollment is associated with improved retention and outcomes in first-time college students but less understood in transfer students. Perhaps one unintended, yet fortuitous, effect of the COVID-19 pandemic, is to explore the effects of reducing scholarship eligibility criteria to half-time enrollment. A survey of all students in the microbiology program was conducted spring 2020 to better understand the challenges students were facing related to COVID-19.

Alexandria Ardissone, Research Assistant—University of Florida; Jennifer Drew, Principle Investigator Florida Pathways S-STEM Project—University of Florida

CS-25 A Genetics Escape Room Final: Virtual Active Learning to Develop Team Skill

An escape-room comprehensive Genetics final was effectively implemented on ground and online to develop team skills, critical thinking, and problem solving. Students reported significantly improved communication, active listening, courage to speak up, problem solving skills, compassion, and leadership. Grades also significantly improved as compared to traditional final exams from previous semesters. This session will describe the escape room implementation in detail to allow attendees to develop their own escape room tailored to their specific STEM discipline. Strategies to encourage participation in a diverse body of students will be discussed.

Gaia Bistulfi, Chair of the Biology and Math Department, Associate Professor of Biology—D’Youville College

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

CS-26 Researcher Identity: Active learning Pedagogy for STEM Learners

Undergraduate research experiences (UREs) are a known predictor of successful outcomes for STEM students, and are often essential technical and theoretical training opportunities. However, intrinsic and extrinsic barriers result in deterrents for engagement. To broaden the STEM workforce, it is necessary to lower barriers of entry to research fields and UREs. We have implemented an introductory, interdisciplinary research practices course for first-year students where they ideate and explore projects in their domains of interest. Students produce formal research proposals, present research posters, and reflect on their learning experience. Students gain skills in research
and data literacy while networking with professionals on campus. This course provides a structured, active-learning experience for students to explore and reflect on development of knowledge in a variety of STEM fields.

Stephanie Lewis, Collegiate Assistant Professor—Virginia Tech; Anne Brown, Assistant Professor of Science Informatics—Virginia Tech; Amanda MacDonald, Undergraduate Research Services Librarian—Virginia Tech

**FAYETTEVILLE ROOM**

**INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Institutional Change/Transformation, Undergraduate Research, Virtual Learning*

**CS-27 Innovative Virtual Learning Environment: Undergrad Public Health Education**

We will present a Public Health Virtual Learning Environment (VLE) project in the Public Health Program at The University of Texas at Austin. The project is part of a multi-year undergraduate curriculum redesign in the College of Natural Sciences to better prepare students for 21st Century workforce opportunities, challenges and demands. The VLE was developed to provide public health students access to real-world public health data and multiple software applications so they can practice solving simulated public health problems. By using this cloud-based learning resource, students are gaining the skills they need to be leaders during the COVID-19 pandemic and in the future. The project leads will share details about how the VLE was developed and launched, as well as initial results and student experiences.

Leanne Field, Clinical Professor and Director, Public Health Program—The University of Texas at Austin; Keely Finkelstein, Associate Professor of Instruction—The University of Texas at Austin; Eric Weigel, Senior Information Technology Manager, Emerging Technologies Team, Central IT—The University of Texas at Austin; Richard Taylor, Clinical Assistant Professor, Public Health Program—The University of Texas at Austin

**FISK ROOM**

**INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS**

*Keywords: Broadening Participation, Community College, Transfer Students*

**CS-28 Credit Hours as a Barrier to Diversity in Environmental Fields**

We explored gender and ethnic diversity of Environmental Studies (ENVStu) and Environmental Science (ENVSci) graduates at four-year institutions in the United States in 2017-2018. Institutions with more than 50% ENVSci and ENVStu graduates identifying as Black, Hispanic or Asian were clustered in coastal areas, while gender breakdown was roughly even. Further investigation will elucidate whether these are minority serving institutions and whether institutions excluded from this list exhibit higher diversity across minority groups. For schools offering both ENVSci and ENVStu degrees, the median number of credit hours was 14 hours higher for ENVSci degrees than for ENVStu degrees (p = 0.0001). This equates to nearly a semester of work, possibly preventing some transfer and late-declaring students from completing this degree in a typical 4-year term.

Jennifer Bradham, Assistant Professor of Environmental Studies—Wofford College; Megan Kelly, Clinical Assistant Professor of Environmental Science—Arrupe College of Loyola University Chicago; Katherine Valde, Assistant Professor of Philosophy—Wofford College

**JACKSON ROOM**

**INNOVATION/IDEATION SESSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Peer Mentoring, Virtual Learning*

**CS-29 I Am a STEM Advocate**

Sub-Saharan Africa records one of the lowest rates of women’s participation in STEM majorly due to the lack of confidence in young girls to study a STEM-related course at the tertiary level. Hence, we present a holistic STEM-centered mentoring model called ‘I am a STEM advocate.’ It is a multi-level agency approach which will train young African secondary school girls to become STEM advocates themselves. In addition to interactive-fun training sessions, each girl will be actively involved in the growth of her community through climate change related activities amongst others. Another level involves building collaborative networks to boost each girl’s contribution. This multi-dimensional approach is proposed to create an attractive learning environment, eliminate cultural biases and stereotypes and inspire love for the environment.

Queensley Chukwudum, Doctor of Financial Mathematics—University of Uyo, Akwa Ibom State, Nigeria; Verrah Otiende, Doctor of Mathematics (Statistics Option)—Technical University of Kenya

**HINDS ROOM**

**INNOVATION/IDEATION SESSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Broadening Participation, Learning Communities*

**CS-30 Expanding the STEM Pipeline with Virtual Peer-to-Peer Learning**

STEM occupations are in urgent demand yet the pipeline is narrowing. COVID-19 significantly derailed academic momentum in crucial STEM courses, and without progress along critically sequenced gateway courses, the road to STEM disciplines is dramatically at risk especially for women, Latinos, and African Americans. In this session,
we will feature a promising new approach where Florida Polytechnic University’s Top STEM students are hired to serve as a virtual network of trained peer learning assistants for specific high schools. By intentionally partnering with calculus teachers, this innovative model increases academic preparation within STEM, develops a much needed pipeline, provides high-impact peer support, and assists teachers with additional learning support during a time of immense complexity.

Ben Matthew Corpus, Vice Provost—Florida Polytechnic University; Samyr Qureshi, CEO—Knack; George Kuh, Chancellor’s Professor & Founding Director—Indiana University & National Institute for Learning Outcomes Assessment

LINCOLN ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Virtual Learning

CS-32 A Novel STEM Methods Course to Enhance STEM Identity of Elementary Education

In an effort to increase the number of Elementary Education (ELED) majors with a robust STEM background and to increase the STEM identity of the ELED majors, we propose a novel STEM methods course wherein Elementary Education (ELED) majors, and Science and Engineering majors participate as co-learners (Wenger 1998). The proposed course will provide STEM content and general pedagogy. We contend that our future K-6 teachers, armed with robust STEM knowledge, will positively impact their K-6 students. As researchers, we seek to investigate teacher identity and efficacy, and the impact of Co-Learning on STEM content knowledge.

Robert Ferguson, Associate Professor of Chemistry—North Carolina A&T State University; Yudan Wang, Associate Professor of Counseling and Senior Researcher—North Carolina A&T State University; Narayan Bhattarai, Associate Professor of Bioengineering—North Carolina A&T State University

MORGAN ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Broading Participation, Communities of Practice, Interdisciplinarity

CS-33 Boundary Exchange: Biosciences and Tibetan Buddhist Monastic Education

Challenges of fostering inclusive biology education can be addressed by educational scholars in terms of boundaries, particularly the concept of boundary crossing. Studies on boundary crossing identify the learning potential of such transactions as dialogical phenomena. We investigated dialogical learning mechanisms of boundary crossing (identification, coordination, reflection, and transformation) in Tibetan Buddhist monastic biosciences learning experiences. Analysis of monastic students’ survey and interview responses support boundary crossing as a useful framework, with potential value for program and curricular design. Closer examination of monastics’ attitudes towards learning science revealed the importance of specific learning mechanisms at different stages of education. Our findings locate the boundary crossing framework within a dynamic process and present a novel perspective in creating inclusive program and classroom experiences for non-traditional students.

Krystle Cobian, Investigator—Coordination & Evaluation Center of the Diversity Program Consortium; Kevin Eagan, Associate Professor and Director of the Higher Education Research Institute—University of California Los Angeles; Lourdes Guerrero, Investigator and Adjunct Faculty—University of California Los Angeles; Damani White-Lewis, Postdoctoral Scholar—University of Maryland
2:30 p.m. – 3:00 p.m. ET
Concurrent Sessions

**ALBANY ROOM**

**INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Broadening Participation, Virtual Learning*

**CS-34 Tips for Designing an Accessible Online STEM Course**

As the pandemic shows no signs of easing up, institutions will continue to need to offer online options for courses and services. In their rush to evolve on-site to online offerings, one issue is often overlooked: how to ensure that digital options are fully inclusive of students with disabilities. This presentation will provide 20 evidence-based tips on how to deliver an online course that is accessible to all students, including those with disabilities, as well as references to useful resources.

**Sheryl Burgstahler**, Director of Accessible Technology Services—University of Washington

**BENEDICT ROOM**

**INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Broadening Participation, Interdisciplinarity*

**CS-35 Digital Intro: A Collaborative, Project-Based Initiative**

Introductory courses, particularly those in the social sciences, provide a largely untapped context for teaching modern digital technology. Digital Intro is an idea for a new project-based learning initiative that connects social science content with modern digital application that empowers students to enter the expanding digital workforce. We have begun to work on a combination of new collaborative structures, supportive learning materials, and innovative teaching strategies aimed at integrating a range of digital projects (e.g. programming, video editing, data analytics, computational software and web development) with traditional introductory course content. The goal is to demonstrate that discipline-specific content can be meaningfully accessed while greatly modernizing the format with which students encounter and interact with that content.

**Lisa Dierker**, Walter Crowell University Professor of Social Sciences—Wesleyan University

**BOWIE ROOM**

**INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Communities of Practice, Virtual Learning*

**CS-36 Linking Labs, Writing, and Information Literacy to Improve Student Success**

This research and scientific writing class is paired as a flexible meta-skills corequisite with the first upper division laboratory research methods course taken (e.g. ecology, microbiology, plant pathology and population genetics) to develop critical thinking and communication skills in the discipline. Featuring instructor feedback on drafts and final resubmissions, and optional consultations with discipline-specific writing tutors during the revision phase, the writing course fulfills the California State University’s undergraduate writing assessment requirement. The program’s success was evaluated with surveys, institutional data, and grades. We evaluated learning using the science writing genre of research papers, where students interpret data from graphs, construct explanations, and practice linking empirical evidence to analytical claims. We measured a significant improvement on final research papers following the course interventions.

**Arlene Haffa**, Associate Professor and Chair Department of Biology & Chemistry—California State University, Monterey Bay; **Jennifer Kato**, Lecturer, PreHealth Advisor—California State University, Monterey Bay; **Corin Slown**, Assistant Professor, College of Science Assessment Coordinator—California State University, Monterey Bay

**CLARK ROOM**

**INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Broadening Participation, Hispanic Serving Institution (HSI), Metacognition*

**CS-37 Assessing Motivation in Introductory College Biology for Student Success**

Student motivation, metacognition and engagement are strong predictors of academic success in the undergraduate biology classroom. Instructors direct students on behaviors aimed to promote self-reflection and self-efficacy towards academic success yet see varying follow-through from students. This research study assesses motivation in students in two separate but parallel, introductory biology courses required for majors at a single upper Midwestern HSI. Students in one course, with usually high attrition and from diverse majors, will be compared to a second with lower...
historical attrition and serving a single pre-professional program. Measures of motivation will be correlated to course grades. Few studies address if student motivation is aligned with proven and implemented pedagogical activities yet behavioral engagement through motivation has been shown to offset lack of college preparedness.

William Martin, Assistant Professor of Biology—Aurora University

CS-38 Flipped Learning: An All-Purpose Swiss Army Knife for Pandemic Teaching

COVID-19 threw Spring 2020 into turmoil. It’s clear that even when this pandemic passes, it will not be the last. To be prepared, higher education must be ready to transition between multiple delivery modalities. A flipped learning approach proved to be remarkably adaptable to a rapid transition to online learning. As uncertainty continues in higher education, and instructors struggle to prepare for future course offerings, flipped learning allows one course design that can be delivered in any format. In this session, a flipped learning course design will be shared; how this format transitioned online will be described; and, we will compare assessment data between traditional and online pandemic cohorts. Participants will leave prepared to create one course design that can be delivered in any format.

Thomas Mennella, Associate Professor of Biology—Bay Path University

CS-39 Centering Mental and Financial Wellness at the Center of STEM Programs

Support for low-income students seeking undergraduate degrees in STEM education has focused on scholarship support, or on academic coaching and tutoring. While these are critical areas for student success, they often fail to address the key issues that are at the top of students’ minds: unmet mental health and wellness needs; the stress of STEM majors combined with college and family life; and lack of financial knowledge and planning. This session will make the case for putting these three issues at the center of program design for student success programming in STEM, rather than an “add-on” component or issues to be referred to other offices on campus.

Rickey Caldwell, Assistant Professor of Mechanical Engineering—Merrimack College; Russ Olwell, Associate Dean of Education and Social Policy—Merrimack college; Brandi Baldock, Assistant Professor of Chemistry—Merrimack college; Julia St. Goar, Assistant Professor of Mathematics—Merrimack college; William McDowell, Assistant Professor of Biology—Merrimack College; Gwyne White, Assistant Professor of Psychology—Merrimack College

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Active Learning, Virtual Learning

CS-40 Using Anti-Racism Education to Impact Peer-To-Peer STEM Instruction

A self-paced anti-racism course, with reading, listening and reflection, has been offered widely on the campus through the Inclusive Communities of Practice Canvas page. A group of undergraduate Learning Assistants (LAs), along with a faculty member, two undergraduate LA mentors and a program director, took the course together over six weeks with weekly meetings for discussion. Our session will discuss feedback from the Learning Assistants about how this course impacted how they think about teaching and supporting underserved students in STEM courses. We will allow time for discussion regarding the need for anti-racism training in STEM departments, and how reading and reflection from scholars of color can impact the future design of anti-racist policies and procedures in these departments.

Rebecca Ciancanelli, Inclusive Pedagogy Lead, Center for Teaching & Learning; Chemistry Instructor—University of Colorado, Boulder; Betsy McIntosh, Learning Assistant Pedagogy Course Coordinator & Instructor—University of Colorado, Boulder

INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Learning Assistance, Learning Communities, Predominantly Undergraduate Institution (PUI)

CS-41 Capacity Building: Thematic Inquiry-Based Mentorship with Enhancement Model

This Innovation/Ideation session discusses a unique curricular model of college/community collaboration between the Science & Technology Entry Program (STEP) and Community, Action, Learning and Leadership (CALL)/First-Year Experience (FYE) Programs at SUNY Old Westbury. The curriculum shared through this session is designed to help students become intentional learners and conscious decision-makers. The STEP/CALL collaboration make course-embedded science and community engagement a cornerstone of college entry, leveraging college, community and foundation resources to enrich student learning, while enhancing the capacity of intercultural understanding.
and communication, teamwork and leadership skills necessary to address pressing science and social issues. The collaborative has honed the career-preparatory rigor in its various components in college readiness and in engaging underrepresented minorities (URM) in STEM subjects, while maintaining a reasonably gender-balanced population.

Hugh Fox, Associate Director of Community Action, Learning, and Leadership (CALL) Program—SUNY Old Westbury College; Fernando Nieto, Professor of Biology, Director of Science & Technology Entry Program (STEP)—SUNY Old Westbury College

**JACKSON ROOM**

**INNOVATION/IDEATION SESSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

Keywords: Broadening Participation, Faculty Mentoring, Institutional Change/Transformation

**CS-42** Academic Developmental Milestones: Facilitating Productivity for URM Women

Structural barriers and lack of STEM belonging and identity impede scholarly productivity, which is one of the most critical components of success in the academy. Productivity in the academy is facilitated through professional development, which is evidenced through the achievement of the milestones associated with faculty ranks (e.g., lecturer, assistant professor, associate professor, full professor and beyond). By addressing the disparities of professional development through unambiguous expectations and intelligible milestones, departments and tenure committees can proactively support their URM women in a successful bid for tenure and promotion. Moreover, intentional professional development grounded in development theories not only promotes and encourages scholastic productivity of underrepresented minority women in the academy, but also creates a culture of inclusion (STEM belonging & identity) and retention.

Pamela Leggett-Robinson, Founder & Executive Director—PLR Consulting; Tyresa Jackson, Graduate Student—Teachers College, Columbia University; Pamela Scott-Johnson, Dean, College of Natural and Social Sciences—California State University Los Angeles; Sherine Obare, Dean, Joint School of Nanoscience and Nanoengineering—North Carolina A&T State University and UNC Greensboro; Angela White, Assistant Dean of Student Success—North Carolina A&T State University; Nichole Powell, Associate Professor of Chemistry—Oxford College of Emory University

**JARVIS ROOM**

**INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH**

Keywords: Assessment, Broadening Participation, Institutional Change/Transformation

**CS-43** Scale Development: Resistant Identity in Historically URG STEM Faculty

Research had stressed the importance of faculty to underrepresented student success (Gasiewski et al. 2012; Hurtado et al. 2015) however, less attention had been paid to professor’s experiences. A review of literature and subsequent survey and interview findings suggest historically underrepresented STEM faculty’s practice of social (racial/ethnic) and science identity may pressure implicit academic science norms (Joseph 2018). This session explores proposed items to measure a new construct, resistant identity (maintains racial and science identity with tensions between enforcing and transforming norms), and its dimensions that include external commitment, supportive orientation, cultural openness, political lens, confrontational willingness, and affective recovery.

Cynthia Joseph, Director, Communication and Dissemination Core & Co-Lead, Administrative Core—Coordination & Evaluation Center at the University of California, Los Angeles; Nicole MacCalla, Lead Investigator—Coordination & Evaluation Center at the University of California, Los Angeles

**LINCOLN ROOM**

**INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH**

Keywords: Interdisciplinarity

**CS-44** Everything Old is New Again: A Mathematical History Lesson for Cybersecurity

Many students express interest in cybersecurity. It is a current “hot” topic in media with job opportunities. A successful career in cybersecurity requires knowledge of a wide set of tools. Many of these tools have interdisciplinary roots. We propose a lesson plan that will introduce students to mathematical applications in cybersecurity.

Donna Schaeffer, Professor—Marymount University; Patrick Olson, Professor—National University

**MORGAN ROOM**

**INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH**

Keywords: Undergraduate Research, Virtual Learning

**CS-45** Creating an Effective Remote Summer Undergraduate Research Program

COVID-19 and the migration to online learning has presented unique challenges to undergraduate research, reducing
opportunities to participate in high impact practices, including in-person summer research programs. To mitigate some of these effects, Loyola Marymount University adapted their Summer Undergraduate Research Program, traditionally held as a 6-week program on campus, to a remote structure. This session will discuss our methods for successfully migrating an existing program online, including our assessment of student satisfaction, self-perceived changes in transferrable life skills and confidence in research ability, and progression on program learning outcomes. Our data indicate that a virtual summer research program can provide robust and meaningful student research experiences; this has implications for future summer research programs, including opportunities to reach new and often underrepresented student populations.

Elizabeth Wimberly-Young, Associate Director for the Office of Research & Creative Arts—Loyola Marymount University; Vanessa Morales, Associate Director for Evaluation and Statistical Support/Center for Research Excellence—Loyola Marymount University; Kathleen Weaver, Associate Provost for Research, Professional Development, and Online Learning—Loyola Marymount University

3:15 p.m. – 3:45 p.m. ET
Concurrent Sessions

ALBANY ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Course-based Undergraduate Research, Undergraduate Research

CS-46 Helping Students Move into Undergraduate Research

While undergraduate research experiences (UREs) are linked to positive student outcomes, disruption of the educational landscape by COVID-19 necessitates creative solutions to support participation in UREs. We have developed programs (Research Rookies/Research Recruits) for first- and second-year students that cultivate competencies, skills, and professional readiness necessary to network into and be ready for meaningful URE activity. We will present strategies for aligning program objectives and student outcomes with data from a qualitative analysis of open-ended reflections of STEM alumni (n = 354) on the career-readiness training they received as participants of UREs. The format of our programs is modular, cost-effective, and can be adapted to different modalities (online, in-person, embedded in programs) is modular, cost-effective, and can be adapted to different modalities (online, in-person, embedded in programs). Over time, the number of members from STEM disciplines has increased together with the number of courses receiving the HIP designation for Undergraduate Research. With students' engagement in research, this inclusive approach allows for active learning. Student authorship on a research product helps to retain students by enhancing their self-efficacy.

Dabney Dixon, Director of STEM Education Initiatives and Professor of Chemistry—Georgia State University; Paul Ulrich, Lecturer, Senior Director, Program for Undergraduate Research in the Life Sciences—Georgia State University; Mi’Kayla Newell, Graduate Student—Georgia State University; Joanne Altman, Director of Undergraduate Research and Creative Works—High Point University

BENEDICT ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Professional Development, Virtual Learning

CS-47 Supporting Student Quantitative Skills in Online Environments

As students arrive at college with a broad range of math backgrounds and need to use quantitative skills (QS) more frequently across the curriculum, supporting faculty in meeting this challenge becomes pressing. Online modules for QS development offer opportunities for just-in-time or repeated engagement by students, but faculty often choose resources that support QS development for their disciplinary context rather than resources that foster learners’ ability to recognize and transfer their knowledge to new analogous situations. We discuss the collaborative development (by faculty across disciplines and across institutions) of a set of online modules designed to review and strengthen QS within a course while facilitating transfer, and how faculty think about framing online resources to increase student engagement and buy-in.

Melissa Eblen-Zayas, Professor of Physics—Carleton College; Laura Muller, Director of Quantitative Skills Programs and Peer Support—Williams College

BOWIE ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Active Learning, Broadening Participation, Course-based Undergraduate Research

CS-48 Using FLCs to Integrate Undergraduate Research into the STEM Curriculum

Since Spring 2018, Slippery Rock University has been offering Faculty Learning Communities (FLCs) to promote the integration of High-Impact Practices (HIPs) into the curriculum. An FLC is a small, cross-disciplinary group of faculty and staff, working collaboratively to improve teaching and learning. Three FLCs on Undergraduate Research have been facilitated in this way to offer more students a research experience. The FLC members revised or developed undergraduate-level courses with research as a main component. Over time, the number of members from STEM disciplines has increased together with the number of courses receiving the HIP designation for Undergraduate Research. With students' engagement in research, this inclusive approach allows for active learning. Student authorship on a research product helps to retain students by enhancing their self-efficacy.

Heike Hartmann, Professor of Geography—Slippery Rock University of Pennsylvania; Bradley Wilson, Associate Provost for Academic Affairs and Integrated Learning—Slippery Rock University of Pennsylvania
INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Broadening Participation, Interdisciplinarity

CS-49 Teaching Counternarratives in STEM Using Postcolonial Frameworks

Inclusive and culturally relevant STEM curriculum is seen as an approach to change the culture of science to be more welcoming for students from backgrounds and identity groups historically excluded from the sciences. In this ideation session, participants will be invited to reflect on how to foreground the socio-historical events coinciding with scientific research. Exploring the social construction of scientific knowledge, otherwise portrayed as content, in our classes can humanize the sciences and bring awareness to our social impact while learning about content. Participants are invited to bring ideas for case studies to consider. We will pose questions and explore postcolonial frameworks to dismantle the dominant narrative and selectively foreground the counternarrative of scientific discourse to be relevant for our different institutions and diverse students.

Dox Ovid, Postdoctoral Fellow—San Francisco State University

ELIZABETH CITY ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Community College, Virtual Learning

CS-50 STEM411: A Virtual Tutoring System for STEM Students

Are your students having trouble with their homework or labs? Do they need questions answered outside of class that might not be answered by the tutoring center? STEM411 may be the solution to your institution’s needs. This session will focus on how our college created and built our institution’s virtual tutoring system, STEM411, for students to submit course-related questions and get real-time answers from STEM faculty. STEM411 can be used for one-on-one asynchronous or synchronous tutoring and can be accessed through a computer, tablet, or phone 24/7. Additionally, this session will focus on the entire life cycle for STEM411 and how it can be replicated at other community colleges and universities using their faculty and staff.

Camille Pace, Chair for the School of Business and Associate Professor of Mathematics—Georgia Highlands College

FAYETTEVILLE ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Assessment, Broadening Participation, Communities of Practice

CS-51 Remaking Higher Education

A growing body of evidence on the benefits of “making” emphasizes its influence in increasing access to STEM opportunities and in increasing engagement through interdisciplinary hands-on learning activities that connect ideation and innovation to core content competencies. The emergence of “making” is widely accepted in informal learning spaces, however, this acceptance is limited in higher education. “Making” in higher education provides the context for personal interest, identity, and deeper, sustained learning to transform STEM education. This program will highlight the use of “making” in higher education to create a more flexible, interdisciplinary personalized learning experience embedded in design thinking and computation to foster more STEM education research into “making” and its potential to influence retention and career interests in the STEM field.

Eric Saliim, Director of NCCU FAB Lab—North Carolina Central University

FISK ROOM

INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

Keywords: Broadening Participation, Transfer Students, Undergraduate Research

CS-52 Inviting Community College Students into the University

For the past two summers, the University of Maryland, Baltimore County (UMBC) and Howard Community College designed and implemented a summer research-based experience for small groups of prospective STEM transfer students. This brief session will describe how these two pilots (field-based and digitally-based) are informing an emergent model for transfer success in which community students are invited to engage with the university community early in their careers, and start to build a sense of campus belonging, affiliation and confidence prior to transfer. We argue that these kinds of experiences are key to improving the odds for successful transfer, retention and graduation.

Sarah Jewett, Director, Innovations in Transfer Research and Practice—University of Maryland, Baltimore County; Patricia J. Turner, Dean, Science, Engineering and Technology Division—Howard Community College; Pilar Thomas, Student—Howard Community College; Mary Lenahan, Student—Howard Community College; Semilore Oluwagbenro, Student—Howard Community College
CS-53  **Faculty and Peer Mentoring of Female First Generation Students in STEM**

STEM has successfully become a collection of disciplines that impacts all aspects of our daily lives. Over the years, we have seen stronger enrollment numbers from women in these majors, but obstacles persist for those who are the first from their families to pursue a four-year degree. First Generation Students (FGS) are at an increased risk of being placed on scholastic probation, particularly in STEM disciplines, and prior research has found that female FGS are less likely to persist when faced with scholastic probation. In this discussion, we will talk about existing academic standing policies and support programs, the need for strong mentoring opportunities between STEM peers and faculty, and future directions for better supporting women in STEM.

Brittni MacLeod, Associate Director of the Office of Undergraduate Research and Major Awards—University of Houston

**JARVIS ROOM**

CS-55  **George Floyd, COVID-19, and Inclusive STEM Education for All**

Equity and inclusion efforts in STEM higher education focus on majors, but true inclusion must embrace the two-thirds of students not in these majors. Participants will explore the key features of transformative change in the STEM education of these students. The major/non-major dichotomy would be replaced with an inclusive view that all students are STEM students whose education is critical and highly valued. Courses would be backward-designed from how students will use STEM in their lives, rather than forward-designed to impart the concepts central to a STEM discipline. All students would learn how to incorporate high-quality STEM knowledge into the decisions they make in their personal, professional, and civic lives, thereby equipping a citizenry to better address the complex and persistent issues it faces.

Christopher Murphy, Associate Provost for Curriculum and Liberal Learning—The College of New Jersey
MORGAN ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Broadening Participation, Hispanic Serving Institution (HSI), Undergraduate Research

CS-57 Latinx Students Experiences Preparing for Biomedical Research Careers

This study examines the critical transition from undergraduate to graduate biomedical education and focuses on Latinx students who participated in a NIH-funded biomedical undergraduate research program at a Hispanic-Serving Institution located on the US-Mexico border and transitioned to a graduate program after graduation. We use a community cultural wealth (CCW) to analyze qualitative interviews about students’ experiences applying to graduate school in biomedical fields and how different program interventions allowed students to navigate the graduate school process. Overall students talked about how undergraduate research program facilitated students’ graduate school application process by enhancing different types of cultural capital: aspirational, familial, social, navigational, and resistant. In this session, we provide detailed examples of the different interventions given to the students in the program.

Angelica Monarrez, Post Doctoral Fellow Building Scholars—University of Texas at El Paso; Danielle Xiaodan Morales, Assistant Professor of Sociology—University of Texas at El Paso; Amy Wagler, Associate Professor of Mathematical Sciences—University of Texas at El Paso; Lourdes E Echegoyen, Director, Campus Office of Undergraduate Research Initiatives—University of Texas at El Paso; Angela Frederick, Assistant Professor of Sociology—University of Texas at El Paso

4:00 p.m. – 5:30 p.m. ET
Conference Welcome and Keynote Address

BALLROOM

Keynote Address: Executive Orders

For as long as the United States has existed, executive orders (EO) and their equivalents have been used by presidents to create change. Beyond national policy, the EO is a metaphor for how change happens in higher education. Every EO is motivated by a goal, but that goal is often obscured by the language of the EO; thus, what really matters is not the wording of the EO but what actually happens to people when the words of the EO are put into action. In higher education, our responsibility is to engage in a continuous cycle of reflection, learning, and accountability. Engaging in this cycle has never been more important than today, when our institutions are grappling with structural racism.

David J. Asai, Senior Director, Science Education—Howard Hughes Medical Institute
FRIDAY, NOVEMBER 6, 2020

9:00 a.m. – 9:30 a.m. ET
Mindfulness Session with Stephanie Renee Briggs
BALLROOM

9:30 a.m. – 10:00 a.m. ET
Concurrent Sessions
ALBANY ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Active Learning

CS-58 Engaging Students in STEM through Community Engagement

As part of our new General Education program at the University of Mary Washington, faculty have developed a Community Engagement (CE) designation for courses that meet a Beyond the Classroom requirement. CE courses must include 15 hours of work with the community and must incorporate three learning outcomes: Analysis of Knowledge, Identity/Commitment, and Action and Reflection. Currently, the CE designation is associated with STEM courses in Chemistry, Environmental Science, Education (Scientific Inquiry), and Statistics. This presentation will provide a description of the Fall 2019 Introduction to Statistics CE course, including the Service-Learning data analysis project students completed for a local community service organization. The results of a preliminary study on the impact of the CE designation on students’ attitudes for learning statistics will be discussed.

Debra Hydorn, Professor of Mathematics—University of Mary Washington

BENEDICT ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Active Learning, Assessment, Community College

CS-59 Successful Online Implementation of an In-Person Summer Research Program

The NIH funded Bridges to the Baccalaureate Program at Purchase College, SUNY, currently in its 21st year, is a traditionally in-person, residential summer research program. Due to the COVID-19 pandemic, in early Summer 2020, the program was converted to a 100% online format. The 20-year history of the Program and its recent shift to online offers a unique opportunity to compare learning outcomes between learning formats. Here we will discuss: (1) strategies to compare learning outcomes between in-person and online formats; (2) preliminary data showing that the online Bridges Program in Summer 2020 met or exceeded the learning outcomes of our traditional residential Program; (3) strategies for enhancing retention of underrepresented students in STEM; (4) methods for transferring these strategies to other institutional contexts.

Mark Jonas, Associate Professor of Biology; Associate Director, Purchase College Bridges Program; Project Director, Purchase College MARC U*STAR Honors Program—Purchase College, SUNY; David Troy, Associate Professor of Psychology—Kingsborough Community College, CUNY; Joseph Skrivanek, Distinguished Service Professor of Chemistry; Founder and Director, Purchase College Bridges Program—Purchase College, SUNY

BOWIE ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Active Learning, Broadening Participation, Institutional Change/Transformation

CS-60 Removing Barriers to Participating in Upper-Level Mathematics

Experiencing mathematics at high levels cultivates one’s ability to think rationally and participate productively in complex scenarios. Why, then, do most undergraduate programs in mathematics structure rigid course sequences that prohibit students from participating in upper-level mathematics courses unless they have successfully completed three or more pre-requisite courses? Here we argue that unless intentional change is undertaken, we will continue to restrict mathematical study to a privileged group. In this session, we provide anecdotes of two upper-level mathematics courses without required pre-requisite courses and provide seven instructional and institutional recommendations for designing and teaching upper-level mathematics to a diverse group of students.

Jennifer McNally, Associate Professor of Mathematics—Curry College; Laura Callis, Assistant Professor of Mathematics—Curry College

CLARK ROOM

INNOVATION/IDEATION SESSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Communities of Practice

CS-61 Community Ambassadors: An Approach to Enhance Equity in STEM

To support and sustain a supportive and inclusive environment and culture in science, the College of Science and Engineering at Western Washington University created...
the Community Ambassador (CA) Program. The CA program acknowledges, compensates, and connects a network of faculty across the college who are engaged in equity, inclusion and diversity initiatives. Under the guidance of the STEM Inclusion and Outreach Specialist, seven faculty members-one from each department in the college-met weekly to discuss issues of systemic oppression within the college and university. Through cohort support, varying experience and expertise, and commitment, the CAs collectively advocated and created opportunities for growth within the college and their departments. In this session, we will describe the affordances and limitations of the program.

Regina Barber-DeGraaff, Senior Instructor and STEM Inclusion and Outreach Retention Specialist—Western Washington University; Thanh Le, Assistant Professor—Western Washington University; Leti Romo, Assistant Director of Student Representation and Governance—Western Washington University

FAYETTEVILLE ROOM

INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Broadening Participation

CS-62 Closing Achievement Gaps by Creating Opportunities for Success in STEM

How do we build institutional capacity and support historically underrepresented students in STEM enrolled in community colleges? West Hills College Lemoore (WHCL) serves as an important case in closing achievement gaps in STEM. As an Hispanic Serving Institution (HSI) and the sole accredited provider of postsecondary education in the region, WHCL plays a pivotal role in the lives of students in the San Joaquin Valley. This facilitated discussion highlights how WHCL leveraged its partnership with Science Foundation Arizona (SFAz) to fund National Science Foundation (NSF) S-STEM ACCESS Scholars Program and how that success lead to the current NSF CORES STEM. WHCL is establishing data driven and evidence based practices to assess and evaluate the impacts of STEM student success efforts (e.g. recruitment, outreach, supplemental instruction, faculty mentorship).

Kurt Sterling, Professor—West Hills College Lemoore; Brian Boomer, Director of Grants—West Hills Community College District; Taryn Krazan, External Evaluator—CSU, Fresno; Katy Pinto, Professor of Sociology—CSU, Dominguez Hills

FISK ROOM

INNOVATION/IDEATION SESSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Institutional Change/Transformation

CS-63 Using Design Thinking to Foster a Campus Culture of Educational Innovation

In 2018, our university embarked on a mission to reimagine education for the 21st Century in a way that encourages learner development of competencies and mindsets to uniquely prepare them for the rapidly changing world they will encounter after graduation. To support this initiative, a collaborative and interdisciplinary working group, called IDEA hub (Innovation, Design, Engage & Act) was created to serve as our campus incubator for the solution of complex problems. We will share the story of how embracing the tools and mindsets of design thinking, strategic doing, and lean start-up, we’ve been able to begin building a culture of innovation and develop novel approaches to education that meet the personal, professional, and community needs of the 21st Century workforce.

Mary Raber, Assistant Dean, Pavlis Honors College—Michigan Technological University; Marika Seigel, Associate Professor of Rhetoric and Technical Communication—Michigan Technological University

HINDS ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH
Keywords: Broadening Participation

CS-64 Reframing What Counts: Using the Stories of Black Mathematicians to Inform Teaching

In mathematics, transformation means to move an object from one location (within a coordinate plane) to another. Likewise, we propose shifting undergraduate mathematics education toward equitable practice by examining the experiences of successful Black mathematicians. We present the narratives of a Black male and Black female educator working at a university located in a predominantly Black city as counter-narratives (Solórzano & Yosso 2002a, 2002b) to problematize narratives regarding Black students’ achievement in mathematics, uplift the experiences of marginalized people, and provide recommendations for addressing anti-Blackness in mathematics instruction. These scholars explore how being a Black mathematics educator offers insights about teaching mathematics to Black students, and utilize duoethnography (Sawyer & Norris 2009, 2013) to articulate the cultural and experiential knowledge that guide their instructional methods.

James Holly Jr, Assistant Professor of Urban STEM Education—Wayne State University; Tiana Bosley, Mathematics Resource Center Coordinator—Wayne State University; Darryl Gardner, Director of Student Success, Operational Excellence—Wayne State University
FRIDAY, NOVEMBER 6, 2020

JACKSON ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Broadening Participation

**CS-65  Diversity and Inclusivity in STEM: Exploring Underlying Mechanisms for Demo**

Previous research has shown that performance in introductory STEM courses is critical in pursuing STEM fields and retention in general. In this talk, I will present two research studies exploring the demographic performance gaps in introductory STEM courses using large data sets across four different universities and various STEM introductory courses. The results show that this underperformance is dominated by the incoming preparation of the students, as opposed to other possible factors such as social psychological factors. I will conclude with some suggestions as to how these findings might be used to guide educators to design more effective interventions to support the success of students from underrepresented demographic groups in their introductory STEM courses.

*Shima Salehi*, Assistant Professor of Education, Graduate School of Education—Stanford University; *Cissy Ballen*, Assistant Professor of Biology—Auburn University; *Eric Burkholder*, Postdoctoral Fellow—Stanford University

JARVIS ROOM

INNOVATION/IDEATION SESSION | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Interdisciplinarity, Minority Serving Institution (MSI), Professional Development

**CS-66  Female K12 STEM Educators: Stories of STEM Advocacy Identity Development**

The focus of this mixed research study is on the career and advocacy skill development of female K12 STEM educators. Career decision making among females in STEM, including those who are K12 educators, is related to personhood. This empirical study explored mixed research data gathered from nine K12 STEM educators to learn more about their career development. Data regarding stress, coping, pedagogy, and identity development were gathered, triangulated, and analyzed. Implications for educators, students, employers, and researchers are provided.

*Jack Simons*, Assistant Professor of School Counseling—Mercy College; *Yana Kuchirko*, Assistant Professor of Psychology—Brooklyn College

STEM CENTRAL | TYPE III: NATIONAL-LEVEL INTERVENTIONS

Keywords: Broadening Participation, Communities of Practice, Institutional Change/Transformation

**Inclusion Revisited: Courageous Conversations and Networking for Change**

Trends in higher-education to promote inclusion (e.g. new accreditation standards, hiring diversity and inclusion administrators, social justice efforts) have coincided with incredible educational disruption this year. While there is great opportunity to dismantle old paradigms and re-imagine STEM culture and curriculum to create truly inclusive environments, determining if the outcomes will be substantive remains to be seen. This participatory facilitated discussion led by iEMBER.org network members will focus on STEM inclusion in the current national landscape and will foster the formation of collaborations around shared interests to develop research and action plans as to how to best address these issues both individually and collectively.

*Natalia Caporale*, Assistant Professor of Teaching—University of California Davis; *Latanya Hammonds-Odie*, Associate Professor of Biology—Georgia Gwinnett College; *Jana Marcette*, Director of Graduate Studies—Montana State University Billings

**National Science Foundation: Division of Human Resource Development (HRD)**

Participants will explore the entire funding portfolio of NSF’s Division of Human Resource Development, which is geared toward broadening the participation of marginalized groups in STEM. Ongoing and emerging funding priorities may be discussed. Program officers will be available in this lounge area to answer questions and offer technical advice and insight. Participants will also gain insight in the often misunderstood processes of grant submission and negotiation.

*Claudia Rankins*, Program Officer, National Science Foundation; *Michelle Claville*, Program Officer, National Science Foundation

**National Science Foundation: Division of Undergraduate Education (DUE)**

Participants will explore the entire funding portfolio of NSF’s Division of Undergraduate Education, which is aimed its own separate “lounge” area. Several lounges have already been scheduled. Click [here](#) for a complete list of STEM Central Lobby lounges.
at strengthening STEM education at two- and four-year colleges and universities. Ongoing and emerging funding priorities may be discussed. Program officers of DUE will be available in this lounge area to answer questions and offer technical advice and insight. Participants will also gain insight in the often misunderstood processes of grant submission and negotiation.

Mary Crowe, Program Officer, National Science Foundation

11:30 a.m. – 12:45 p.m. ET

Keynote Session

BALLROOM

Powerful Leadership: Strategies for Impact in a Chaotic World

The call for leadership has never been louder. Are you prepared for the challenges ahead? Impact requires winning strategies and the confidence to use them. This keynote explores 4 essential tactics for leadership success and how to use them, and will provide opportunities to diagnose your leadership strengths, preferences, and flat spots.

Joan V. Gallos, Professor Emerita—Wheelock College

1:30 p.m. – 2:00 p.m. ET

Mindfulness Session with Stephanie Renee Briggs

BALLROOM

2:00 p.m. – 3:00 p.m. ET

Concurrent Sessions

ALBANY ROOM

FACILITATED DISCUSSION | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Active Learning, Broadening Participation, Virtual Learning

CS-67 Using Light Board Technology to Give an Online “Face-to-Face” Interaction

Light board technology gives faculty the ability to record videos and let students see the instructor just like they would in a lecture hall. While these videos are done asynchronously, this exposure to the faculty member allows students to learn important course information and important problem types. This technology allows for faculty to deliver different problems, graphs, data, and even animations while explaining the foundational material. Using a light board for asynchronous lecture delivery in tandem with synchronous office hours/problem sessions can build an effective learning environment.

Daniel Collins, Senior Lecturer of Chemistry—Texas A&M University

CS-68 Closing the Socioeconomic and Academic Gaps to Increase Education Equity in STEM

Overcoming socioeconomic disadvantages can improve student retention and academic achievement and transform STEM education. The Living with the Lab program helps empower first-year engineering students by creating an active learning environment through student ownership of their lab and equipment regardless of their socioeconomic status. This program has been shown to increase hands-on activities through meaningful projects that promote critical thinking, group discussion, and diversity of thought and ideas. The program has shown, by the various colleges that have implemented it, that students are content with the curriculum and pedagogy regardless of gender, race, and socioeconomic status. This work will investigate the practices within the program that create a positive and equitable culture within and outside the engineering classroom.

Louis Reis, Lecturer—Louisiana Tech University; Krystal Corbett, Lecturer—Louisiana Tech University; Allie De Leo-Allen, Director of Enrollment Management and Employer Relations—Louisiana Tech University

CS-69 Exploring the Impact STEM UREs Have on Underrepresented Minorities

The National Science Foundation, Louis Stokes Alliance for Minority Participation Tampa Bay Bridge to Baccalaureate (TB-B2B) grant, supports St. Petersburg College Science, Technology, Engineering, and Mathematics (STEM) underrepresented minority students pursuing STEM degrees, and provides resources for undergraduate research experiences (UREs). UREs are conducted in Microbiology/Biology, Mathematics/Statistics, Environmental Science/Ecology, Robotics and Cybersecurity Technologies. Student activities include performing primary literature research; conducting laboratory experiments; goal setting and status updates; calculating averages in Excel; sampling bacteria count; applying aseptic technique on agar plates; participating in ecological restoration at lake; designing and administering survey to local residents, analyzing results; designing, building and programming autonomous robotics using the Lego Mindstorm EV3 kit; applying cybersecurity knowledge/skills to perform primary research regarding Capture the Flag competition forms and available open-source resources.
**CLARK ROOM**

**FACILITATED DISCUSSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS**

*Keywords: Active Learning*

**CS-70** Fabricating a Single Sex Female Makerspace for Women to Explore STEM

This facilitated discussion of an institutional level intervention is designed to help campus executive leadership, presidents, provosts, department deans, and college foundation presidents install STEM based resources that encourage greater STEM participation from female students.

*Lawrence Nightingale, Evening and Weekend Coordinator—Old Dominion University; Indigo Eriksen, Associate Professor at NVCC and Doctoral Candidate—George Mason University; Brenna Cooley, Manager, Adult Volunteer Development—Girls Scouts National Capital Region*

**ELIZABETH CITY ROOM**

**FACILITATED DISCUSSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS**

*Keywords: Community College, Institutional Change/Transformation, Hispanic Serving Institution (HSI)*

**CS-71** From Hispanic Enrolling to Hispanic Serving in Community Colleges

How do we build capacity and support Hispanic Enrolling Institutions to become Hispanic Serving Institutions (HSIs)? Arizona State University (ASU), Excelencia in Education, and the Maricopa Community College District (MCCD) examine key practices discovered at exemplar 4-year STEM HSIs and how they can be applied at 2-year HSIs in STEM programs. We pilot the innovative STEM-ESS in a Computer Information Technology (CIT) department in one college in the district (year 1) then rollout to four additional colleges in the district (years 3-5). The STEM-ESS approach uses the existing institutional knowledge to assess capacity and priorities. In addition, it incorporates evidenced based practices to support long term institutional change. In this session, we highlight how this approach and STEM-ESS is transferable to two-year HSI institutions.

*Maria Reyes, Dean, Industry and Public Service—Maricopa Community College District; Cynthia Pickering, Research Program Manager—Arizona State University; Noé Ortiz, Seal Program Manager—Excelencia in Education; Gloria Gonzalez, External Evaluator—Gonzalez Consulting; Katy Pinto, Professor of Sociology—California State University Dominguez Hills*

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**Fayetteville Room**

**FACILITATED DISCUSSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS**

*Keywords: Communities of Practice, Course-based Undergraduate Research, Institutional Change/Transformation*

**CS-72** Promoting Equity and Inclusivity Through Multidisciplinary CRE at a PUI

Course-based research experiences (CRE) are widely recognized as a high-impact educational practice that promotes inclusion and equity. At Lawrence Technological University, a PUI in Metro Detroit, faculty have transformed the curriculum of over 30 courses in the College of Arts and Sciences to include CRE. This unique effort includes faculty from diverse disciplines, including humanities, communication, social sciences, mathematics, computer science, and natural sciences, and has evolved into a cohesive community of practice. In addition to creating a shared vision for our intervention—the three pillars of CRE—our community has established workshops, journal clubs, and an invited speaker series on topics related to diversity and inclusion to broaden the outreach of our initiative in an effort to transform our institutional culture.

*Shannon Timmons, Associate Professor of Chemical Biology—Lawrence Technological University; Paul Jaussen, Associate Professor of Literature—Lawrence Technological University; Franco Delogu, Associate Professor of Psychology—Lawrence Technological University*

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**Fisk Room**

**FACILITATED DISCUSSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

*Keywords: Assessment, Broadening Participation, Institutional Change/Transformation*

**CS-73** Transformational Change: Aligning Institutional Values and Inclusive Excellence

Cultural practices in and outside of STEM classrooms contribute to disparate levels of success for students who are members of underrepresented groups relative to those for whom educational policies and practices were traditionally designed to serve. Transforming methods of evaluating teaching—so that students, faculty, departments, and administrators focused on improving teaching and learning are more systematically aligned—has the potential to foster wider use of evidence-based and inclusive educational practices to address disparities in undergraduate STEM education programs and courses. In this session, members of the Teaching Evaluation Collective share a proposed set of guidelines for how to work toward significant and sustainable change in STEM teaching and learning though cultural transformation.
**HINDS ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

*Keywords: Active Learning, Faculty Mentoring, Undergraduate Research*

**CS-74** Mentored Undergraduate Research Improves Student Development at an HBCU

Exposure to mentored undergraduate research is a valuable learning process to improve student career development in STEM. Students grow personally and professionally in a closed environment, which is not feasible in traditional labs. Through NSF HBCU-UP support, Benedict College STEM students interacted with faculty mentors in the 2020 virtual summer research experience. They learned the entire process from designing to data analysis and presenting their work. Students learned about writing abstracts, presenting in the journal club, and received feedback from their peers and judges. A few of the undergraduate research project resulted in a peer-reviewed publication.

*Samir Raychoudhury, Professor and Director, HBCU-UP Implementation Project—Benedict College*

**JACKSON ROOM**

**WORKSHOP | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Broadening Participation, Professional Development*

**CS-75** Choose Your Own Adventure: Using Gamified Learning to Promote Motivation and Mastery

Gamified learning uses elements of game design such as (a) autonomy over task completion, emphasis on material mastery, and occasionally, friendly competition between participants, to improve learning outcomes. Further, gamification can provide a flexible mode of instruction that benefits both faculty and students during times of instability. While gamification has been around for over a decade, published literature in the higher education setting is lacking and many instructors who want to explore this pedagogy are unsure how to begin or what they can expect. This session will highlight three different ways that gamification can be used successfully in higher education STEM classrooms. Participants will leave with concrete ideas about how they can apply this technique to their courses in the future.

*Sabrina Grondhuis, Associate Professor—Millsaps College; Elizabeth Hussa, Associate Professor—Millsaps College; Sarah Lea Anglin, Professor—Millsaps College*

**LINCOLN ROOM**

**WORKSHOP | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

*Keywords: Broadening Participation, Communities of Practice, Institutional Change/Transformation*

**CS-77** COVID-19 and STEM Learning Spaces: Current Changes and Future Opportunities

This interactive workshop, facilitated by the Learning Spaces Collaborative, focuses on the impact of COVID-19 as STEM spaces for learning are planned, repurposed, and assessed. The pandemic changed more than our use of space, it is changing the questions asked as campuses wrestle with where and how students learn. We begin with an overview of work by an informal taskforce of academics and architects which began gathering such questions in 2020. Facilitated table discussions will take up the majority of the workshop, allowing the opportunity to share personal experiences and comments on the earlier work. Table groups will prepare and present a set of critical "take-home" questions that summarize the key issues confronting us all.

*Bob Kolvoord, Dean and Professor, College of Integrated Science and Engineering—James Madison University; Pamela Scott-Johnson, Dean of Natural and Social Sciences—California State University Los Angeles; Michael Kerchner, Associate Professor—Washington College*
### Metacognition: The Game Changer for STEM Student Success!

In today’s rapidly changing learning environment it is more important than ever for students to become independent self-directed learners who can demonstrate higher order thinking skills. However, few students have been prepared to develop critical thinking skills and are frustrated when good memorization skills do not yield the results they are expecting. Faculty lament that students are focused on achieving high grades, but do not invest the necessary effort in learning. This interactive workshop will equip faculty to teach students how to learn by presenting cognitive science research-based activities that can be used to facilitate higher order thinking and critical reasoning. Participants will leave with a plethora of strategies to increase student engagement and academic success.

**Saundra McGuire**, Director Emerita, Center for Academic Success and (Ret) Professor of Chemistry—Louisiana State University and A&M College

### Success via Peer Education: Enhancing Retention, Engagement, & Persistence

The Division of Academic Enhancement at the University of Georgia uses a robust Peer Education (PLaTO) framework to enhance the learning and educational experience of undergraduates – one foci: large, introductory STEM courses. Part of the Peer Education effort consists of a semester-long, 1-credit-hour pedagogy course designed to develop Peer Learning Assistants’ (PLAs) skills of engaging peers as well as deepen content mastery. This pedagogy course is a College Reading & Learning Association (CRLA) accredited course that has demonstrated significant gains in PLA’s leadership, communication skills, growth mindset, and persistence. In this session, attendees will: examine the Peer Education training structure at the University of Georgia; consider its application to their institution’s needs; and, experience elements of the training designed for STEM success.

**Nicholas Colvard**, Assistant Head of Faculty—University of Georgia; **Thomas Hagood**, Director—University of Georgia

### What Do Your Students Think? Automated Analysis of Student Writing in STEM

Current best teaching practices include an emphasis on the authentic practices of STEM disciplines, including constructing explanations, which are best assessed in an open format rather than multiple choice. To overcome the challenge of assessing large numbers of student open responses, our group developed an automated formative assessment tool capable of rapidly producing reports about student thinking in various STEM disciplines. Our studies indicate that the tool performs equally well on student responses from multiple institution types. Instructors have successfully used this tool to refine teaching practice, develop instructional materials, and improve student learning. In this workshop, attendees will explore the tool and reports to examine student thinking, and interact to discuss methods they can use in the classroom to address misconceptions and improve learning.

**Juli Uhl**, Research Associate in CREATE for STEM Institute—Michigan State University; **Megan Shiroda**, Research Associate of Automated Analysis of Constructed Response—Michigan State University; **Jenifer Saldanha**, Assistant Professor of Biology—Michigan State University; **Kevin Haudek**, Assistant Professor of Biochemistry—Michigan State University
relationships and with intra- and inter-institutional partners, and 5) changing policies and reward systems.

**Krystle Cobian**, PhD Research Analyst—UCLA; **Hector Ramos**, Research Analyst—UCLA

**CLARK ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Hispanic Serving Institution (HSI)**

**CS-81 Culture Survey to Assess LatinX Inclusion in STEM Fields at a HSI**

Inclusion is a main force for student retention at any Hispanic Serving Institution (HSI). To understand how inclusion is perceived by both students and faculty at the University of Puerto Rico—Humacao (UPRH), a culturally sensitive climate survey was designed, validated and imparted. The survey also considered the scientific identity of our STEM students, and how our faculty are coping with the COVID-19 pandemic. Most students and faculty felt a sense of belonging and a strong scientific identity at UPRH. However, faculty recognized a lack of inclusive and equitable environment in their departments. While the analysis and reflection of the climate survey is still in progress, we already implemented several virtual strategies like learning communities and mentoring programs to promote inclusive excellence at the institution.

**Kevin Alicea-Torres**, Associate Director of Puerto Rico Outstanding Undergraduate Diversified Program—University of Puerto Rico at Humacao; **Josee Vedrine-Pauleus**, Co-Director of Puerto Rico Outstanding Undergraduate Diversified Program—University of Puerto Rico at Humacao; **Gabriela Garcia**, Evaluator Advocate at BECOME—BECOME Center; **Ayesha Boyce**, Assistant Professor of Education—University of North Carolina Greensboro; **Lilliam Casillas-Martinez**, Director of Puerto Rico Outstanding Undergraduate Diversified Program—University of Puerto Rico at Humacao

When we hear the word diversity, what comes to mind? With increasing calls for equity and inclusion in science, diversity seems to be at the forefront of national conversations. The classroom is one space where we, as STEM educators, communicate our values and invite students into the research and scholarship of our disciplines. In this interactive session, we will facilitate a discussion on the different ways in which diversity can be conceptualized in the classroom and how these conceptions inform instructors’ approaches to teaching, learning, and curriculum design. Together, using research data from a qualitative interview study with 30 faculty participants, we will examine the features and variations that make up these different conceptions and reflect on approaches to create more equitable and inclusive spaces.

**Nicole Suarez**, Graduate Student—University of California San Diego; **Song Wang**, Graduate Student—University of California San Diego; **Stacey Brydges**, Teaching Professor—University of California San Diego; **Stanley Lo**, Associate Teaching Professor—University of California San Diego

**FAYETTEVILLE ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Broadening Participation, Community College, Transfer Students**

**CS-83 A Community Cultural Wealth Understanding of Marginalized Students’ Success**

This study offers insight into the experiences of marginalized STEM students at a research-intensive institution. The findings in this study are shaped using Yosso’s (2005) community cultural wealth (CCW) framework, an alternative to deficit-based social capital frameworks prevalent in previous generations of study. This study focuses on the overlap of aspirational capital (hope in the face of challenges) and navigational capital (the ability to maneuver through oppression despite systemic disadvantage). It builds on previous work that notes the interplay of these components of Yosso’s framework (e.g., Ortiz et al. 2019; Samuelson & Litzler, 2016). The findings can be used as a foundation for administrators and educators to adapt systems and praxis to build anti-racist and truly inclusive STEM environments throughout tertiary STEM education.

**Erica Sausner**, STEM Education Research—Binghamton University; **Cassandra Wentzel**, Research and Scholarship Advisor—Binghamton University; **James Pitarresi**, Vice Provost for Online and Innovative Education, Executive Director, Center for Learning and Teaching—Binghamton University

**ELIZABETH CITY ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Broadening Participation, Interdisciplinarity, Professional Development**

**CS-82 Conceptualizing Student Diversity in the Classroom**

The Department of Biology at NC A&T has adopted a major cultural shift in its advising strategy. The new approach encompasses a Life Mapping and Advising Model that builds faculty-student relationships and engages both parties effectively in the process. The model includes six important pillars to drive student success: (1) dedicated advising...
space, the Life Mapping and Advising Center, (2) effective advisors, (3) integrated peer mentor and peer tutoring programs, (4) an intrusive advising strategy, (5) integration with first-year student success courses, and (6) life coaching. Since the implementation of the model in 2016, the retention rate of first-time, full-time freshmen has increased from 71.1% to 76.9%, and 82.6% of students survey reported a preference for the LMAC advising model over traditional advising structures.

Angela White, Assistant Dean of Student Success—North Carolina A&T State Univ; C. Dinitra White, Associate Professor of Biology—North Carolina A&T State University; Callisha Petty, MAT Coordinator—North Carolina A&T State University; Checo Rorie, Associate Professor of Genetics/Department Chair—North Carolina A&T State University

**HINDS ROOM**

**WORKSHOP | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords: Active Learning, Interdisciplinarity, Undergraduate Research**

**CS-85 Teaching Technology through Art: Summer Camp as Community-Engaged Research**

In this workshop we share examples of—and tools to support—community-engaged STEM initiatives in the college classroom. Over the past decade e-textiles and paper-circuits have gained significant traction in the modern maker movement. These hybrid technologies blend electronics, coding, and contemporary fabrication processes with traditional crafts; artist-educators often deploy these techniques to build more inclusive K-12 STEAM classrooms. Our project applies these techniques to the development of simple solderless synthesizer kits for kids’ summer camp. We discuss models for engaging student research assistants in the development and implementation of these and other outreach activities to support their learning and growth in STEM disciplines. We facilitate a brief discussion and brainstorming session to invite participants to imagine their own ideas for community-engaged learning in STEM.

Abby Aresty, Technical Director and Lecturer—Oberlin College and Conservatory; Rachel Gibson, Graduate Student—University of Virginia

**JARVIS ROOM**

**WORKSHOP | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords: Professional Development**

**CS-87 Why and How to Do Evidence-Based Teaching: Promoting Active Learning & Mentorship**

Evidence indicates that using active learning practices positively affects student attitudes, motivation and performance in STEM courses. These practices especially help to increase learning gains, reduce the achievement gap, and increase retention of URM and first-generation students. Instructors often struggle to learn and implement effective active learning methods on their own. The PALM Network bridges this gap by delivering long-term, individualized mentorship in adopting active learning in undergraduate lecture classrooms in biology and related fields that teach biology undergraduates. It also provides the support and encouragement of a larger network of instructors from diverse fields and types of institutions across the country, as well as support from a network of professional societies. PALM serves as a replicable model of professional development that furthers STEM education.

Greg Crowther, Instructor—Everett Community College; Sue Wick, Professor Emerita, Principal Investigator of PALM grant—University of Minnesota Twin Cities; Stephanie Blumer, Assistant Professor—Oakton Community College

**JACKSON ROOM**

**WORKSHOP | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords: Assessment, Broadening Participation, Undergraduate Research**

**CS-86 Build the Framework to Streamline Assessment: Scaffold Skills and Assess with Signature Assignments**

In this workshop, attendees will be guided through a model of how to develop a straightforward, streamlined, and meaningful outcome-based assessment program. Participants will engage in program learning outcome (PLO) design, scaffold outcomes throughout a curriculum based on an example, and will learn how to use signature assignments for course level assessment of multiple program learning outcomes. The facilitators will also present a model showing how course level assessment can be tied to program level assessment. We encourage participants to bring pre-developed PLOs to the workshop if they are available.

Geoffrey Bowers, Assistant Professor of Chemistry—St. Mary’s College of Maryland; Pamela Mertz, Professor of Biochemistry—St. Mary’s College of Maryland; Kelly Neiles, Associate Professor of Chemistry—St. Mary’s College of Maryland

**LINCOLN ROOM**

**WORKSHOP | TYPE III: NATIONAL-LEVEL INTERVENTIONS**

**Keywords: Broadening Participation, Institutional Change/Transformation, Leadership**

**CS-88 Experience the Difference: A Virtual Approach to Leadership Development**

This workshop will introduce you to PKAL’s STEM Leadership Institute (SLI) and the practice that sets the SLI apart from other leadership development programs, Experiential
Learning Exercises (ELE’s). In addition to examining the SLI, this interactive session will use a virtual ELE to help you experience how ELE’s can be used to explore essential aspects of leadership, teambuilding, and inclusivity. This specific ELE has been utilized and adapted for online environments with the intention of allowing each participant to reflect upon what happened during the ELE from a leadership perspective. The participants will expand their reflections to apply the lessons learned from the ELE to advance team-building and grow inclusive leadership capacity on their own campuses.

Brandon Schwab, Associate Provost for Academic Affairs—Western Carolina University; William Davis, Associate Dean—Washington State University; Allison (Al) Leone, Director of Tucker Leadership Lab—William Jewell College; Mary Majerus, Professor Dept of Mathematics & Physics—Westminster College

4:30 p.m. – 5:30 p.m. ET
Poster Session

POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

**Keywords:** Course-based Undergraduate Research, Predominantly Undergraduate Institution (PUI), Undergraduate Research

**P-1 Fly-CURE: A Multi-Institutional Course-Based UG Research Experience**

The Fly-CURE is a multi-institutional course-based undergraduate research experience in genetics centered on the genetic mapping and characterization of Drosophila melanogaster by undergraduate students at nine institutions (including public, private, and an HSI). Undergraduate researchers have successfully mapped several EMS mutants which has led to local and national scientific presentations by students, as well as four peer-reviewed publications. This project has given research exposure to over 300 undergraduate researchers within the classroom setting. We have piloted and validated an assessment tool to understand the impact of Fly-CURE on students’ attitudes toward research and their understanding of common genetics learning objectives. As an NSF-IUSE funded project, we will be expanding the genetics CURE to increase student access to an authentic research experience.

Kayla Bieser, Associate Professor of Biology—Nevada State College; Jacob Kagey, Associate Professor—University of Detroit Mercy; Joyce Stamm, Professor—University of Evansville; Alysia Vrailas-Mortimer, Associate Professor—Illinois State University

POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

**Keywords:** Historically Black Colleges and Universities (HBCU), STEM Faculty Summer Bridge Programs, Virtual Learning

**P-3 Examining a Research Simulation for Underrepresented STEM Students**

STEM degrees and careers lack diversity due to black and brown students not persisting within the pipeline. While there have been interventions geared toward students from racially diverse backgrounds across all levels of education, no other study to our knowledge has looked at the effects and usability of an online automated research simulation case study (RSCS) that provides an authentic research experience. Through Lent’s Social Cognitive Career Theory, we examined how the automated-RSCS impacts students’ higher-order thinking and scientific self-efficacy. Participants (n = 33) participated in a pilot study where pre and post-assessments were analyzed using repeated measures t-test and Chi-square goodness of fit test. There were statistically significant findings and several implications found with the data that could be groundbreaking within the STEM field.

Brittany Chambers, Graduate Research Assistant—HBCU STEM Undergraduate Success Research Center; Lycurgus Muldrow, Executive Director of the HBCU STEM Undergraduate Success Research Center—HBCU STEM Undergraduate Success Research Center
POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Assessment, Historically Black Colleges and Universities (HBCU), Virtual Learning

**P-4 Online vs. Traditional Education for STEM Students in HBCU**

After the corona virus breakout event, the use of online learning technology shift from being a ‘nice to have’ to ‘critical’ for education. Uncovering these functions, and realizing that how things work face-to-face is not how they work online with remote participants, is a research needed to explore further for faculty and students. Much of the research previously conducted favors distance education; however, in much of this research, only distance learning students were sampled. To achieve a more realistic picture of how students perceive distance education, it is important to question students who have participated in both traditional and distance education. This research will address this issue by comparing student perceptions of course quality in both distance and traditional courses.

*Dongyang Deng,* Assistant Professor of Environmental Health and Safety—North Carolina Agricultural and Technical State University

**P-7 Tell Us What We Don’t Know: Remote Teaching Take-Aways Informed by Students**

As a result of the transition to remote instruction, a questionnaire was designed and administered to obtain course-level feedback about the student experience during remote learning. This poster will highlight the experiences of undergraduate students enrolled in life and physical sciences during spring 2020. In particular, it will display the results of closed- and open-ended questions to address: 1) the perceived effectiveness of course activities; 2) satisfaction of learning assessments; and 3) responsiveness of instructor/TA. Additionally, we will emphasize the findings in the context of both labs and lectures, and for different student demographics. Overall, students were positive about remote instruction and their responses were used to generate take-aways and best practices for instructors.

*Erin Sparch,* Postdoctoral Scholar, Center for Educational Assessment—University of California Los Angeles; *Molly Jacobs,* Coordinator for Curriculum Assessment, Center for Educational Assessment—University of California, Los Angeles; *Leigh Harris,* Director of Curricular Initiatives, Undergraduate Education Initiatives—University of California, Los Angeles; *Marc Levis-Fitzgerald,* Director, Center for Educational Assessment—University of California, Los Angeles

POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

Keywords: Active Learning, Assessment, Metacognition

**P-5 Course Redesign for Critical Thinking and Scientific Literacy Development**

We redesigned an introductory brain sciences course to foster critical thinking (CT) and scientific literacy skills, while still providing foundational knowledge. Uniting relevant theory, our work defines CT in the context of STEM learning environments, and assesses alignment between our and the students’ definitions of CT, and between students’ self-perceived outcomes and the course’s design goals, tools, and resources. We utilized focus groups and surveyed students taking the Fall 2019 course. Responses indicated alignment between CT development and the course writing components, the availability of resources, “dig deeper” requirements, and clarity of expectations. Results reinforce the importance of clear definitions and purposeful goal alignment in course design, and suggest ways to increase critical thinking and scientific literacy through written assignments in large introductory STEM courses.

*Rachel Foster,* Problem Solving Fellow—Brown University

**P-8 Improving Bioinformatics Knowledge and Skills through Exploration of Genes**

Course-based undergraduate research experiences (CUREs) have numerous positive impacts on students, including achievement gaps among students and lead to higher graduation and retention rates of students traditionally underrepresented in the sciences. With funding from the Howard Hughes Medical Institute (HHMI) Inclusive Excellence program, Towson University has been creating a series of Course-based undergraduate research experiences (CUREs) to engage students in authentic research in the classroom. The switch to an on-line modality in March 2020 followed by on-line courses in Summer and Fall 2020 necessitated extensive rethinking of how to meet student learning objectives. We will share challenges and lessons learned from courses in molecular biology, cell biology, bioinformatics, organismal form and function, and ecology, including new approaches that will continue to be used when we return to in-person or hybrid classes.

*Laura Gough,* Professor and Chair—Towson University; *Matthew Hemm,* Associate Professor—Towson University; *Rommel Miranda,* Professor—Towson University

**P-6 Teaching Research Courses On-Line During a Pandemic: Challenges and Lessons**

Incorporating active learning and research experiences into college classrooms has been shown to decrease
increased knowledge of course content, independence, and interest in related subject matter. The Yeast ORFan Gene Project promotes an easily transferable, collaborative CURE that provides bioinformatics and wet lab modules to guide student learning in experimental design, with the aim to determine the function of yet uncharacterized Saccharomyces cerevisiae genes. The bioinformatics modules can be done remotely, and student-generated video guides are available for each module. Pre- and post-test assessment results (n=440) confirm that students gained an understanding of the Gene Ontology (GO) system for describing gene function and knowledge in the use of bioinformatics to assign gene function.

Jill Keeney, Professor of Biology—Juniata College; Tammy Tobin, Professor of Biology—Susquehanna University; Erin Strome, Professor and Chair of Biological Sciences—Northern Kentucky University; Pamela Hanson, Professor of Biology—Furman University; David Aiello, Associate Professor of Biology—Austin College; Mary Miller, Professor and Chair of Biology—Rhodes College

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords:** Broadening Participation, Professional Development

### P-9 How Inclusion is Communicated (or not) Through the Course Syllabus

How many of you have spent time perfecting your Syllabus only to have your students not read it and then wonder how soon will you start getting the dreaded questions that you will invariably answer with “It’s in the syllabus!” Why do we want the students to engage with the syllabus? The syllabus is a student’s first point of contact with the class and its instructor and it will set the tone. What you choose to include in it and how you write can create a big impact on your students. In this session we will discuss what elements in the syllabus promote inclusion and I will share a rubric on how you can check your syllabus for both content and inclusion.

Rita Margarida Magalhaes, Project Coordinator, Inclusive Excellence Initiative—Rochester Institute of Technology

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords:** Active Learning, Assessment, Broadening Participation

### P-10 Innovative Ideas and Strategies to Enhance Student Success

Our overarching goal is to explore innovative strategies to enhance persistence and successful outcomes in foundational math courses as part of the general education curriculum for STEM and non-STEM majors. Many students especially students of color and first-generation college students are in dire need of academic and non-academic support. Given wide differences in students’ prior knowledge, aptitudes, abilities, and attitudes, a one-size-fits-all approach will not be conducive to their success. Because every learner is unique, engineering an environment rich in resources and formative assessments capable of navigating every student from their current “location” is paramount to helping students reach competency at their own pace.

Huda Makhluf, Professor, Department of Math and Natural Sciences—National University

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords:** Active Learning, Broadening Participation, Historically Black Colleges and Universities (HBCU)

### P-11 Utilitarian Scientific Literacy for Pre and Early Freshmen STEM Majors

A comprehensive, utilitarian scientific literacy curriculum has been developed that targets pre- and early-freshmen STEM majors with evidence that this curriculum improves students’ success in college-level STEM courses and enhances intrinsic motivation and self-management skills. Utilitarian scientific literacy is defined herein as a freshman STEM major being knowledgeable of what is required to be a successful STEM major, and possessing the skills, attitudes and behaviors for success. This curriculum was first developed for in-person instruction but has subsequently been launched online as a comprehensive course that can be utilized independently at any institution. The online scientific literacy course contains twelve chapters/modules, with each chapter containing a lecture, activity, and quiz. Several chapters are extensive and include searchable data bases.

Lycurgus Muldrow, Director Academic Affairs—Morehouse College

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

**Keywords:** Active Learning, Hispanic Serving Institution (HSI), Professional Development

### P-12 Using Relationships and Alternative Pedagogies to Combat Science Illiteracy

Due to today’s lack of scientific literacy, it is paramount that undergraduate students form a deep understanding of science and the processes by which we disseminate information. However, for many undergraduates, the ability to develop these concepts is inhibited by social/cultural disparities that form roadblocks to their education. Through professional development with, “The Pedagogy of Real Talk” at Amarillo College, Real Talk and Alternative Lessons are designed to quickly build student/instructor relationships through shared experiences, which increases student comfort while exploring interests with their instructor. Socratic teaching and student-driven learning strategies are also incorporated through the development of an Alternative Lesson. During the workshop, attendees will reflect and discuss how they can apply this approach in their classroom and examine data collected from its use.
Jacob Price, Assistant Professor—Amarillo College; Heather Voran, Instructional Design & Faculty Development Coordinator, Center for Teaching & Learning—Amarillo College; Paul Hernandez, Author of “Pedagogy of Real Talk”—Mount Wachusett Community College

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Course-based Undergraduate Research*

**P-13  Optimizing Science Identity through Novel Research**

We provide a microbiology course description, including initial student outcomes as well as examples of student results generated during a Course Based Undergraduate Research Experience (CURE). This course analyzes bacteria isolated from regional locations (bat guano, wine pond, bioreactors, etc.). The microbiology course introduces students to microorganisms (bacteria, viruses, protzoa, algae, fungi), their significance as model systems for understanding fundamental cellular processes, and their role in human affairs. The course also introduces the biological properties of bacterial and animal viruses, replication, methods of detection, interactions with host cells and multicellular hosts. Students utilize scientific practices, discover new findings relevant to the scientific community, and practice collaboration as well as iteration. We report that the CURE functions as an effective practice for developing students as scientists.

Tracey Ramirez, Researcher—University of California Santa Cruz; Jennifer Kato, Lecturer—California State University Monterey Bay; Corin Slown, Assistant Professor—California State University Monterey Bay; Arlene Haffa, Associate Professor and Chair of the Biology and Chemistry Department—California State University Monterey Bay

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Assessment, Virtual Learning*

**P-14  Automated Analyses of Written Responses Reveal Student Thinking in STEM**

Instructors in STEM courses often use formative assessments to collect data on student learning. Reflection on this data can help instructors assess pedagogical effectiveness and address students’ learning needs. Constructed response (CR) questions require students to explain concepts and phenomena in their own words and have the potential to reveal scientific as well as naive ideas. We present a case study of how results from administration of a CR question via an automated formative assessment tool to college students led to changes in classroom instruction. The question was used in an introductory biology course and focuses on information flow. We will highlight how the results revealed unexpected information about student thinking, influenced change in pedagogy and content, and as a result improved student understanding.

Jennifer Saldanha, Assistant Professor—Michigan State University; Juli Uhl, Research Associate for CREATE for STEM—Michigan State University; Mark Urban-Lurain, Associate Professor Emeritus—Michigan State University; Kevin Haudel, Assistant Professor of Biochemistry—Michigan State University

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Hispanic Serving Institution (HSI)*

**P-15  Remote Learning Lessons: Re-Engaging Metacognitive Conversations in STEM**

Students in foundational science courses such as the second semesters of chemistry and biology benefit from active learning. Metacognitive conversations help students think about and discuss their personal relationships to reading, the social environment and resources of the classroom, their cognitive activity, and the kinds of knowledge required to make sense of text. During remote learning, as a result of the COVID-19 pandemic, classroom and homework activities that facilitate metacognitive conversations can provide opportunities to re-engage students in learning. The Reading Apprenticeship Framework integrates four-dimensions into metacognitive conversation: the social dimension, the personal dimension, the cognitive dimension, and the knowledge-building dimension. Each of these dimensions activate students creating a learning community of practice as students engage with challenging problems and texts, building disciplinary expertise.

Erin Stanfield, Lecturer and Coordinator for the Cooperative Learning Center—California State University Monterey Bay; Corin Slown, Assistant Professor—California State University Monterey Bay

**POSTER | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS**

*Keywords: Active Learning, Broadening Participation, Metacognition*

**P-16  Effectiveness of Self-Regulated Learning Strategies in an Engineering Course**

Instructors must prepare engineering undergraduates to become lifelong learners despite conventional engineering curriculum and instruction lacking the building blocks supporting lifelong learning. Implementing self-regulated learning (SRL) in engineering courses can inculcate lifelong learning in students by building metacognition, strategic action, and self-motivation. SRL strategies help both thriving and at-risk students develop a sense of control over their own learning. In so doing, learners can better understand their weaknesses and strengths and appropriately plan their learning. Strategies assessed in this pilot study (N= 36) included (a) developing their own questions, Bring Your Own Question, (b) Grading their own homework, Self-Grading, (c) predicting scores, Confidence Bonus, and (d) grading peers, Error Quiz. Overall, these SRL strategies show potential for developing engineering students’ lifelong learning.
Including high scholar satisfaction with the program. And survey data support the efficacy of these efforts, committed collaboration among these units. Assessment of supports are grounded in the practice of reflection, critical thinking skills and Graduate Record Exam, Journal Club, faculty and student research presentations and funding for faculty to enhance their research skills. We have formulated a foundation for student academic success that translated into increased retention, GPA, graduation rates, enrollment in STEM graduate programs, and employment in STEM disciplines. Additionally, our emphasis on faculty development has resulted in an increase in faculty extramural funding and publications.

Freddie Dixon, Professor of Biology, Program Director of NSF HBCU-UP Program—University of the District of Columbia; Anita Wood, Program Manager, NSF HBCU-UP Program—University of the District of Columbia; Carolyn Cousin, Professor of Biology, Senior Faculty of NSF HBCU-UP Programs—University of the District of Columbia

P-18 Holistic Student Interventions Support Student Success in STEM

At John Carroll University, our National Science Foundation-funded S-STEM program provides academic, personal, professional and financial support for low-income students with high potential to succeed in STEM. Our suite of supports are grounded in the practice of reflection, a metacognitive strategy supporting academic success, vocational discernment, and personal growth. The most intensive work with students occurs during the first year, including a Summer Bridge Program, two academic courses (Entering Science, Entering Research), a STEM Living Learning Community (LLC), and weekly cohort advising sessions. These supports engage scholars with faculty and staff from multiple divisions on campus and require consistent and committed collaboration among these units. Assessment and survey data support the efficacy of these efforts, including high scholar satisfaction with the program.

P-19 Broadening STEM Research Opportunities with Institutional Collaborations

The STEM Summer Scholars Institute (SSI) is part of an initiative to provide underrepresented students with an intensive STEM laboratory research experience and to enhance interest in attending graduate school. STEM SSI facilitates opportunities for MSI partner institutions and Indiana University students in areas designed to prepare them for the next steps of their academic careers. These include GRE preparation, career exploration, poster presentation skills, mentor-mentee relationship building, and other professional development activities. Utilizing a mixed-method approach, the purpose of this study is to understand how the STEM SSI experience was attributed to academic and/or career success. Participants in the program demonstrated improvements in numerous metrics including graduate school attendance and subsequent completion of PhDs in the STEM fields and/or professional degrees.

Bianca Evans, Assistant Dean, Diversity and Inclusion—Indiana University

P-20 Post-Baccalaureate Research Training Program at XULA

The post-baccalaureate technician program (PTP) implemented under Project Pathways (the National Institutes of Health (NIH)-funded Building Infrastructure Leading to Diversity (BUILD Program) at Xavier University of Louisiana, provides research experience and soft skills training to recent Xavier graduates to increase their preparation and competitiveness for biomedical graduate programs. This program is distinct in that students stay at the national institution during the additional training period. Target students lack the self-confidence and/or preparation for applying to competitive post-baccalaureate programs because they are often undecided about their next academic/career steps until late in their undergraduate years. Familiarity with the institution makes the application and transition processes more comfortable, encouraging these late-deciding students to apply and participate, and resulting in better outcomes for their placement in graduate programs.

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Maryam Foroozesh, Professor of Chemistry, Administrative and Research Enrichment Core Director, NIH/NIGMS funded Building Infrastructure Leading to Diversity (BUILD) Program—Xavier University of Louisiana; Tiera Coston, Assistant Director for Mentoring and Pre-Law Advising, Center for the Advancement of Teaching & Faculty Development—Xavier University of Louisiana; Amy Billizon, Program Manager, NIH/NIGMS funded Building Infrastructure Leading to Diversity (BUILD) Program—Xavier University of Louisiana; Kathleen Morgan, Professor of Chemistry, Student Training Core Director, NIH/NIGMS funded Building Infrastructure Leading to Diversity (BUILD) Program—Xavier University of Louisiana.

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Active Learning, Broadening Participation, Interdisciplinarity
P-21 Facilitating Difficult Discussions in STEM
Science, technology, engineering and mathematics continue to have serious problems related to diversity, equity, and inclusion. Given the increased awareness surrounding issues such as racism and sexism, we have a renewed opportunity to make STEM a place where everyone is welcomed, valued, and supported. Many of us may be more open and eager than ever to talk about these issues, but what if we lack the tools to facilitate these discussions? We provide a toolkit for facilitating discussions on challenging and often controversial issues in STEM. Our approach draws from theory on democratic classroom discussions and on our experience engaging students in weekly discussions intended to develop STEM identity, facilitate innovation in STEM, and realize a more diverse, equitable, and inclusive future in STEM.

Kelsey Gray, Assistant Director of Grand Challenges Initiative—Chapman University; Gregory Goldsmith, Director of Grand Challenges Initiative—Chapman University.

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Communities of Practice, Institutional Change/Transformation
P-22 Salaries in Higher Education: A System-Wide Perspective on Gender Equity
Despite gains in academic participation, female faculty still face gender disparity in salary among STEM fields. Although this finding is prevalent, most studies have been conducted within a single institution or field. Here, we determine the extent of salary gender inequality across STEM faculty of a regental state system in the Midwestern United States. Salaries of STEM faculty across nine years were collected from the six institutions within that system. Controlling for rank, year, and length of service, female STEM faculty earned significantly less than their male counterparts; these disparities were evident even within the first year of service. As percentage-based increases do not remove existing gender-based inequity among salaries, other system-wide policies are likely needed to address current levels of gender inequity.

Andrea Liebl, Assistant Professor of Biology—University of South Dakota; Pam Rowland, Assistant Professor of Cyber Security—Dakota State University; Alyssa Kiesow, Interim Dean—Northern State University; Meredith Redlin, Professor of Sociology and Rural Studies—South Dakota State University.

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Learning Communities, Metacognition, Professional Development
P-23 Building Inclusive Classroom Practices: A Curriculum Based on Metacognition
An increasingly diverse student population necessitates revision of traditional attitudes toward teaching and learning, particularly development and adoption of inclusive practices. However, faculty often lack knowledge of, or training in, inclusive pedagogical strategies. We present a year-long learning community that engages faculty with metacognitive and inclusive classroom strategies and forms a community network within the institution. Semi-structured interviews with participants reveal that the experience helps faculty increase their awareness of classroom issues of inclusion, develop an asset-based model of their students, create and apply new pedagogical strategies, and feel part of a new, inclusion-oriented community.

Rita Margarida Magalhaes, Project Coordinator, Inclusive Excellence Initiative—Rochester Institute of Technology; Elizabeth Hane, Associate Professor—Rochester Institute of Technology.

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Learning Communities, Predominantly Undergraduate Institution (PUI)
P-24 S-STEM Scholars: A Success Story in Retention and Graduation of Students from Underrepresented Groups
The NSF-funded Scholarships for STEM (S-STEM) Scholars program at the University of West Florida was established to increase college access to financially disadvantaged, academically talented students by reducing financial barriers while providing support and professional development tools critical to Scholars’ success. Twenty-five freshman Scholars received annual scholarships for up to four years, 88% of whom had three or more risk factors to their success. A novel STEM for Life Seminar series, an eight-semester sequence of courses, was implemented to create a cohort experience while simultaneously providing professional development and mentoring necessary to mitigate the aforementioned known risk factors.

Karen Malek, Chair and Associate Professor of Chemistry—University of West Florida; Erica Taylor, Lecturer—University of West Florida; Michael Huggins, Dean of College of Science and Technology and Professor of Chemistry—Tarleton State University; Laura Godfrey, Consultant—Independent.
POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

P-25 Assessment and Curricular Reform of STEM General Education Courses

There is a current need to improve STEM General Education (GE) curricula in order to render them relevant, interdisciplinary and inclusive, as well as to investigate the differences in scientific learning, attitudes, and perceptions of STEM and non-STEM majors. Embarking on this endeavor in 2018, the University of California Los Angeles (UCLA) established common learning goals and student learning outcomes for its General Education Foundations of Scientific Inquiry (GE FSI) curriculum; this encompassed 100+ courses across several disciplines. A detailed assessment plan was developed by UCLA’s Center for the Advancement of Teaching to target students: (1) course learning experiences; (2) scientific literacy skills; and (3) attitudes toward science after GE FSI courses. This poster will present findings from the 2019-2020 assessment along with details from debriefs with GE FSI instructors.

Roshini Ramachandran, Assistant Director of Curricular Initiatives—University of California Los Angeles; Molly Jacobs, Coordinator for Curriculum Assessment—University of California Los Angeles

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

P-26 ACCESS STEM: Myths, Mysteries, and Lessons Learned

ACCESS STEM, a partnership between St. Cloud State University and Anoka-Ramsey Community College, Ridgewater Community College, and St. Cloud Technical and Community College, has three goals: 1) recruit scholars and award scholarships of up to $10,000 per year for four years; 2) support retention, STEM persistence, and successful graduation of scholars; and 3) bridge the transfer gap between two- and four-year institutions. The implementation and effectiveness of the project were evaluated by external evaluators from the Center for Applied Research and Educational Improvement (CAREI) at the University of Minnesota. Evaluation methods included mid- and year-end scholar surveys, scholar focus groups, and interviews with project team members. Myths, mysteries, and lessons learned from the evaluation of this NSF S-STEM Track 3 multi-institutional consortia will be shared.

Latha Ramakrishnan, Professor of Biochemistry—St. Cloud State University; Jane Fields, Research Associate—University of Minnesota

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

P-27 Supporting Underrepresented STEM Majors through Early Advising and Student-Driven Programming

There is a need to increase the capacity and diversity of the STEM workforce, however low enrollment and high attrition rates in STEM majors persists in higher education. Gender, race/ethnicity, and socioeconomic status influence student success, and providing opportunities to underrepresented students and supporting their engagement in STEM is necessary to overcome these barriers. With National Science Foundation S-STEM funding, the University of Saint Joseph established the CATaLYST Scholars Program (CSP) with the goal of increasing low-income and underrepresented students in STEM majors and careers. Institutional interventions including first year STEM advising, increased academic support services, cohort classes, and early exposure to research were implemented. Data from the first two years of the program will be reported to assess outcomes of the CSP versus a control group.

Irene Reed, Associate Professor of Biology—University of Saint Joseph; Jesse Crandall, Assistant Professor of Chemistry—University of Saint Joseph; Derek Dube, Associate Professor of Biology—University of Saint Joseph

POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

P-28 Design of On-Site and Virtual Bootcamp STEM Programs to Promote Inclusion

High-quality STEM educational programming effectively incorporates cutting-edge scientific content, strong instructional pedagogy, and sensitivity to diversity and equity issues. Within this framework, professors from STEM and Education disciplines at the University of Puerto Rico-Humacao created and delivered a 3-day on-site and a 3-week virtual bootcamp for incoming STEM students. The bootcamp included a highly interactive schedule with teamwork activities, psychoeducational workshops, demonstrative classes in STEM and social events in an inclusive, accepting and motivational environment with mentorship by older students. Evaluations showed both camps were beneficial for incoming STEM students and camp mentors. For freshmen, it was a good opportunity to interact with peers and faculty, build trust, and get to know the university. Mentors reported professional growth, increased networking, and developing leadership skills.

Sandra Rodriguez, Assistant Professor of Biology—University of Puerto Rico-Humacao; Rebecca Batchelor, Adjunct Professor of Biology—University of Puerto Rico-Humacao; Ileana Rodriguez, Associate Professor of Chemistry—University of Puerto Rico-Humacao; Ayesha Boyce, Assistant Professor of Education—University of North Carolina; Gabriela Garcia, External Evaluator—BECOME Center; Grettel Arias, Graduate Student—University of North Carolina
POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

**Keywords:** Assessment, Broadening Participation, Historically Black Colleges and Universities (HBCU)

**P-29  Academic Interventions at HBCUs: A Search for a Common Framework**

This investigation will broadly address the factors related to STEM persistence, academic resilience, and identity. The researchers conducted a pilot study in fall 2018. 1000 STEM students participated in an online survey. Initial analysis of the data revealed differences among HBCUs in terms of levels of support for STEM students and the risks of attrition. Additionally, psychometric analyses found inconsistencies in reliability and validity measures of subscales taken from other assessment instruments. The results of this data led to the application of a common social science framework across several STEM-focused, academic interventions at HBCUs. The findings from this study range from analyses of key barriers to African American students’ positive identity development in STEM, to indicators of and requirements for theory-driven, academic interventions at HBCUs.

Amy Salter, Research Associate—Morehouse College; Cheryl Talley, Professor—Virginia State University; Victoria Davis, All But Dissertation (ABD) Fellow—Virginia State University; Mi’Kayla Newell, Graduate Student Fellow—Georgia State University

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POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

**Keywords:** Institutional Change/Transformation, Hispanic Serving Institution (HSI), Learning Communities

**P-30  Building Institutional Capacity to Promote Students’ STEM Success**

To promote success in introductory STEM courses and support non-traditional students’ transition to upper-level coursework, the DU STEM Success Model is building institutional capacity at an HSI to transform first and second-year courses in biology, chemistry, and mathematics to promote engaged student learning and enable diverse students to succeed in STEM. Capacity building efforts target individuals (i.e. course instructors, tutors and case managers) and programs (i.e. STEM academic departments, academic and non-academic support programs). Capacity building focuses on inclusive practices, course-embedded tutors and peer-led team-learning workshops; and supplementary case management. We describe our model and report evidence of increased capacity and positive student STEM success outcomes.

Tina Taylor-Ritzler, Professor and Chair, Department of Psychology—Dominican University; Christopher Anderson, Associate Professor of Biological Sciences—Dominican University; Katherine Powers, STEM Learning Specialist—Dominican University; Jeanette Mokry, Associate Professor and Chair, Mathematics—Dominican University; Rahel Bokretson, Lecturer, Physical Sciences—Dominican University; Pliny Smith, Assistant Professor, Biological Sciences—Dominican University

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POSTER | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

**Keywords:** Active Learning, Minority Serving Institution (MSI), Professional Development

**P-31  Effects of a Certificate Program on Teaching Perspectives of STEM Faculty**

The Active Learning, Inquiry Teaching (ALIT) program supports STEM faculty in adopting evidence-based pedagogies to foster retention and development of STEM majors. The program offers professional development to help faculty teach for inclusion, promote self-regulated learning, and provide deliberate practice for students. Participants attend workshops, gather mid-term student feedback, and are observed teaching. To assess the program, we ask whether the ALIT program influences faculty awareness, attitude, and adoption of evidence-based pedagogies. We documented beginning- and end-of-program Teaching Perspectives Inventories (TPI) and written reflections to capture faculty’s growth. TPI scores increased significantly over time. Reflections conveyed how faculty priorities evolved from content-delivery to responding to learning needs. The ALIT program may aid transformation of faculty practice by shifting their role from ‘teacher’ to ‘inclusive facilitator.’

Tory Williams, Assistant Director for Pedagogical Research—University of Maryland Baltimore County; Linda Hodges, Associate Vice Provost for Faculty Affairs, Director of Faculty Development Center—University of Maryland Baltimore County

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POSTER | TYPE III: NATIONAL-LEVEL INTERVENTIONS

**Keywords:** Assessment, Broadening Participation, Institutional Change/Transformation

**P-32  Developing Multi-institutional Collaborations in Student Analytics**

Understanding the changing national landscape of STEM higher education requires comparison, collation and integration of student outcome data across multiple institutions. Not only is this logistically difficult, but it is further complicated by universities having different procedures for handling student data and different rubrics for coding student characteristics. In this session we will: (1) present the kinds of data that are usually available at the institutional level and their limitations; (2) discuss solutions to challenges encountered when working across institutions; and (3) engage in conversations with participants about the kinds of research questions that can be addressed by using multi-institutional data. Discussion of student outcomes will be at the institutional level and from the perspective of the systemic inequities that exist in higher education.

Natalia Caporale, Assistant Professor of Teaching—University of California, Davis; Sarah Castle, Graduate Student—Michigan State University; Kameryn Denaro, Project Scientist—University of California Irvine
The Turning the Kaleidoscope Webinar Series is an exclusive component of the 2021 AAC&U Institute series for STEM faculty, in response to the challenges imposed by COVID-19 restrictions on traditional modes of professional development. While AAC&U has extensively used virtual platforms in the past to deliver cutting edge professional development curricula to STEM faculty, recent efforts have led to the re-fashioning of these platforms in ways that will minimize overload and maximize utility. Each session of this series has been designed to prepare participants for the critical, self-reflective work of AAC&U Institutes, and for undergraduate STEM reform, at large.

Kelly Mack, Vice President for Undergraduate STEM Education—Association of American Colleges and Universities; Sasha Kolomensky, OUSE Program Associate and Assistant to the Vice President—Association of American Colleges and Universities; Christina Shute, Program Coordinator—Association of American Colleges and Universities; Tania Siemens, Research Associate—Association of American Colleges and Universities; Maria Qadri, Scientific Communications Postdoctoral Fellow—Association of American Colleges & Universities

## Expanding STEM Central: A Metacommunity for Broadening Participation in STEM

STEM Central is a national undergraduate STEM reform online networking platform of the Association of American Colleges and Universities – serving over 4,000 STEM faculty, education researchers, and administrators who are passionate about broadening participation in STEM. Grounded in the communities of practice learning theory (Lave and Wenger 1991), STEM Central offers synchronous and asynchronous modes of interaction in both in-person and digital spaces. By offering workshops, working groups, a database of resources, webinars, blogs, and newsletters, STEM Central fosters the kind of cross disciplinary and institutional collaboration necessary for elevating, promoting, and adopting best practices for broadening participation in STEM higher education.

Kelly Mack, Vice President for Undergraduate STEM Education—Association of American Colleges and Universities; Tania Siemens, Research Associate—Association of American Colleges and Universities

## CASL Keystroke: Writing the Soul of Broadening Participation in STEM

The Center for the Advancement of STEM Leadership (CASL) invests in and investigates what lies at the soul of a unique ecosystem of knowledge, behavior, and wisdom that characterizes HBCU leadership. The thought-leadership development program of CASL, or Keystroke, holistically addresses the growing need for more HBCU STEM faculty voices in the national discourse on broadening participation. To accomplish this goal, Keystroke targets the underlying, often unspoken, challenges that preclude all faculty, but particularly HBCU STEM faculty from publishing in mainstream scientific literature and media outlets. As a result, Keystroke has developed a novel knowledge transfer framework that serves as a viable solution for success in publishing successful broadening participation work and outcomes.

Kelly Mack, Vice President for Undergraduate STEM Education—Association of American Colleges & Universities; Maria Qadri, Scientific Communications Postdoctoral Fellow—Association of American Colleges & Universities

## Illuminating Institutional Capacity Building for Inclusive Excellence

The Association of American Colleges and Universities (AAC&U) has convened the Inclusive Excellence Commission...
(IEC), an interdisciplinary team of national experts to critically examine the Inclusive Excellence (IE): Engaging All Students in Science initiative of the Howard Hughes Medical Institute (HHMI). Through the collection and analysis of HHMI IE project data, the IEC is positioned to build upon existing literature by operationalizing and illuminating: 1) the conditions of institutional change; and 2) the principal activities of institutional learning that institutions must consistently engage in for institutional capacity building for inclusive excellence to occur. This poster will provide an overview of the conceptual tools that guide the ongoing and iterative work of exploring and understanding institutional capacity building for inclusion in the sciences.

Tyheia Robinson, Assistant Director of Research and Policy—Association of American Colleges and Universities; Kelly Mack, Vice President for Undergraduate STEM Education—Association of American Colleges and Universities; Melvin Hall, Professor—Northern Arizona University; John Matsui, Assistant Dean—University of California Berkeley; Patrice McDermott, Vice Provost of Faculty Affairs—University of Maryland, Baltimore County; Kate Winter, Independent Evaluation Consultant—Kate Winter Evaluation

POSTER | TYPE III: NATIONAL-LEVEL INTERVENTIONS
Keywords: Broadening Participation, Leadership, Professional Development

P-38 My Tenure Trek®: An Experiential Diversity Simulation for STEM Faculty

My Tenure Trek® (MTT®), an exclusive simulation of the AAC&U Project Kaleidoscope Leadership Development Institute, is a powerful professional development tool designed to awaken and sensitize emerging STEM leaders to the influences of power and privilege within higher education, and to create broad awareness about micro-aggressions and implicit biases, which undermine national attempts to diversify the STEM workforce. A critical step in addressing this trend is to raise the consciousness of STEM faculty about the lived experiences of individuals from diverse backgrounds.

Kelly Mack, Vice President for Undergraduate STEM Education—Association of American Colleges and Universities; Christina Shute, OUSE Program Coordinator—Association of American Colleges and Universities

POSTER | TYPE IV: STEM EDUCATION RESEARCH
Keywords: Active Learning, Professional Development

P-39 Findings from 10 Years of Math Instructor Teaching Professional Development

Student-centered, research-based instructional strategies (RBIS), such as inquiry-based learning (IBL), have been shown to improve learning and persistence in US undergraduate STEM education. Professional development (PD) on teaching for college instructors has been identified as an influential factor in the adoption of RBIS. This research uses longitudinal survey data at 3 points from 700 participants of broadly similar, intensive IBL workshops offered from 2010-2020. Workshops sought to increase classroom implementation of IBL and were largely successful with 93% of workshop participants implementing IBL and reporting teaching practices consistent with the approaches taught at workshops. Regression analysis showed that workshops increase IBL capacity, and contextual factors such as institutional support, course coordination, and small class size were positively associated with instructors’ implementation of IBL teaching practices.

Tim Archie, Research Associate—University of Colorado Boulder; Sandra Laursen, Senior Research Associate—University of Colorado Boulder; Charles Hayward, Senior Professional Research Assistant—University of Colorado Boulder; Stan Yoshinobu, Professor—Cal Poly San Luis Obispo; Devan Daly, Professional Research Assistant—University of Colorado Boulder

POSTER | TYPE IV: STEM EDUCATION RESEARCH
Keywords: Broadening Participation, Faculty Mentoring, Peer Mentoring

P-40 Impacts of Supports on Student Affect in an Engineering-Focused S-STEM

This research study took place in the context of an engineering-focused, National Science Foundation S-STEM grant. The program employs a variety of curricular and co-curricular support activities and structures to promote retention and success, particularly for students from groups traditionally underrepresented in engineering. An initial cohort of students participated in online focus groups toward the end of their first year of undergraduate study, discussing ways in which program components impacted their skills and academic and career plans. Qualitative analyses of focus group transcripts indicated that program supports, especially the seminar and mentoring components, positively impacted students’ affective development and that this aided in retention through their first year. Implications both for this program and for similar efforts at other institutions will be discussed.

Joseph Brobst, Research Assistant Professor, Center for Educational Partnerships, Old Dominion University; Elizabeth Litzler, Director, Center for Evaluation & Research for STEM Equity—University of Washington; Sura Alqudah, Assistant Professor, Engineering & Design Department, Western Washington University; Jill Davishahi, First Year Programs Director and Assistant Professor, Engineering & Design Department, Western Washington University; Andrew Klein, Professor, Engineering & Design Department, Western Washington University

POSTER | TYPE IV: STEM EDUCATION RESEARCH
Keywords: Broadening Participation, Interdisciplinarity, STEM Faculty Summer Bridge Programs

P-41 Summer & Academic Year STEM Programming Support Transition to College

The National Science Foundation S-STEM program at John Carroll University focuses on advancing undergraduate STEM education and improving retention and persistence of low income, high potential students in STEM, particularly...
for underrepresented minorities and first generation college students. As part of this program, scholars participate in a two week Summer Bridge Program (SBP) prior to matriculation. Our assessment data indicate that participation in the SBP increased scholar research efficacy significantly and helped scholars transition to college. In their first year, they also enroll in Entering Science and Entering Research courses, which emphasize the importance of interdisciplinarity in science and excite them about undergraduate research early. Together, these scaffolded experiences have supported scholar transition to college and academic engagement and success.

Shurong Fang, Associate Professor—John Carroll University; James Watling, Associate Professor—John Carroll University; R. Bruce, Assistant Provost for Institutional Effectiveness—John Carroll University; Rebecca Drenovsky, Dean of Graduate Studies—John Carroll University

POSTER | TYPE IV: STEM EDUCATION RESEARCH

P-42 Defining the A in STEAM as Arts for Access

The STEM to STEAM movement began at the Rhode Island School of Design by utilizing the arts to add creativity to STEM content areas. Integrating the arts into STEM enhances student engagement and achievement (Sousa & Pilecki, 2013). This research bolsters this as a means to making STEM content accessible to all students. By utilizing a qualitative multiple case study approach, we will respond to the research question: How do we create pedagogical spaces for educators to construct their own meaning and personal understanding of STEAM as the catalyst for conceptual change? Our work began with teachers and preservice teachers. We are in the process of including all undergraduate students through an innovative general education program. We will share our story and our next steps.

Lindsey Haubert, Assistant Professor of Math Education—Heidelberg University; David Cotter, Instructor of Theater—Heidelberg University; Stacey Pistorova, Assistant Professor of Early Childhood Education—Heidelberg University; Stephen Svoboda, Director of Theater—Heidelberg University

POSTER | TYPE IV: STEM EDUCATION RESEARCH

P-43 Understanding STEM Students’ Feelings of Competence and Worthiness

A mixed methods study examined how students' experiences in STEM majors affects their feelings of self-esteem. Using a two-factor model of self-esteem, competence and worthiness were measured to understand students' feelings about their skills (competence) and feelings about their sense of belonging (worthiness). Preliminary results indicate: (1) students feel better about their self-esteem in general than they do in their STEM major; (2) STEM students tend to feel more competent than they feel worthy; (3) gender, academic rank, and major interact to impact these feelings; and (4) when worthiness is present it is closely tied to competence. Benefits of including students in research that focuses on understanding student beliefs and behaviors will also be discussed.

Rachelle Hippler, Associate Professor of Software Engineering—Baldwin Wallace University; Connor Carlson, Student Researcher—Baldwin Wallace University; Cody Gould, Student Researcher—Baldwin Wallace University

POSTER | TYPE IV: STEM EDUCATION RESEARCH

P-44 Sexuality and Gender as Embodied Literacies in STEM Students

Identity is at the center of social change. The ways in which students navigate the spaces they occupy depends on internalized discourses of identity. These internalized discourses of identity serve as forms of literacy. Language becomes bodies, bodies become language. This is important for those who identify as lesbian, gay, bisexual, trans, and/or queer/questioning as language can serve to validate or invalidate identities. This session uses grounded theory and an interdisciplinary approach to consider the reflections of STEM college students who identify as lesbian, gay, bisexual, trans, and/or queer/questioning on identity formation through their youth in relation to the language and labels used by others, ascribed to themselves, and ultimately used as embodied literacies of identity.

Meg Jones, Doctoral Student—University of Rhode Island

POSTER | TYPE IV: STEM EDUCATION RESEARCH

P-45 Creating a Pipeline from Gateway Courses to STEM Programs for Talented Women

Community colleges, as institutions that disproportionately serve underrepresented populations (i.e. women, African Americans, Hispanics and Native Americans) in STEM disciplines, are uniquely positioned to address the shortage of female STEM graduates (Hanover Research 2014). One of the major challenges for community college students interested in degrees in STEM is their inadequate preparation for advanced level mathematics courses resulting in many STEM students failing or dropping out of pre-requisite gateway math courses (Hanover Research 2014). The largest implication from our Women and STEM study, discussed below, is the opportunity to increase the number of talented women pursuing STEM careers. We recommend that interventions be introduced while students are taking college algebra. We introduce some of the interventions and contrast them with the current curriculum.

Carolyn King, Associate Professor of Mathematics—City University of New York-Queensborough; Clara Wajngurt, Professor of Mathematics—City University of New York-Queensborough
**P-46** Have NSF S-STEM Scholarships Changed SEISMIC Scholar’s Work Circumstances?

SEISMIC, Bridgewater State University’s National Science Foundation S-STEM grant program, provides $6,000 scholarship for three years to rising sophomore students from diverse backgrounds. While the scholarships defray Scholar’s costs, annual program surveys and interviews reveal that many SEISMIC scholars continue to work off-campus jobs while in the program. In this poster presentation, we review quantitative and qualitative evidence collected during the first four years of the S-STEM grant to assess Scholar’s financial and work commitments. Preliminary analysis reveals that some students do not take off-campus jobs while in the program, but most do, with some working full-time hours. Analysis of interviews with students graduating the program reveal how Scholars weighed their commitment to the SEISMIC program and STEM education with their off-campus circumstances and responsibilities.

**Colby King,** Assistant Professor of Sociology—University of South Carolina Upstate; **Jibril Solomon,** Assistant Professor of Social Work—Bridgewater State University; **Jennifer Aizenman,** Director, Center for the Advancement of STEM Education—Bridgewater State University; **Thomas Kling,** Professor of Physics—Bridgewater State University; **Stephen Waratuke,** Professor of Chemistry—Bridgewater State University

**P-47** Examine the Impact of Performance Pyramid Based PLCs on Biology Knowledge

This presentation will review the impact of peer-led learning communities (PLCs) on STEM outcomes of students at a Historically Black University. Students in the PLCs had greater biology knowledge and reported increased constructive feedback when compared to control groups. Attendees will learn evidence-based instructional supports for STEM students. Attendees will learn how to consult with post-secondary instructors to develop PLCs and evaluate outcomes. The cultural context and support needs at the HBCU will be highlighted.

**Qingxia Li,** Associate project—Fisk University; **Thomas Gross,** Assistant professor—Western Kentucky university; **Patricia McC Carroll,** Instructor—Fisk University

**Keywords:** Broadening Participation, Interdisciplinarity, Historically Black Colleges and Universities (HBCU)


**P-48** Challenges & Keys to Successfully Implementing Inclusive Teaching

Colleges across the U.S. have experienced an increase in student diversity while research has demonstrated the connection between student’s sense of belonging and their academic performance in college. Much has been done to innovate teaching practices to respond to this diversity and to foster sense of belonging. But are these innovations being implemented in the classroom? Often, the measure of implementation is faculty surveys. This study focused on whether there is a gap between faculty’s intention to implement inclusive teaching practices and their actual implementation in the classroom, using both interviews and observations, and what factors influence the existence/absence of a gap. Understanding faculty’s implementation/non-implementation of inclusive practices is vital to develop strategies with departments and institutions aimed at fostering sense of belonging and inclusion.

**Rita Margarida Magalhaes,** Project Coordinator, Inclusive Excellence Initiative—Rochester Institute of Technology

**Keywords:** Active Learning, Broadening Participation, Faculty Mentoring


**P-49** Latinx Undergraduate STEM Experiences: Igniting Identity & Career Interests

Through an instrumental case study (Stake 1995), interviews grounded by the science identity model of Carlone and Johnson (2007) explore the ways in which 10 Latinx postdoctoral scholars describe the influence of their undergraduate STEM experiences on their STEM identity and STEM career interests. Deductive data analysis strategies resulted in two themes: (1) STEM teaching and research opportunities are critical to shaping STEM identity and interest in a STEM career and (2) STEM mentorship incites a passion for supporting future generations of STEM professionals. This knowledge may be critical for bolstering STEM identity and for increasing the number of Latinx individuals who enter STEM careers, as well as may provide fresh insights for interested stakeholders who can improve STEM undergraduate spaces.

**Sylvia Mendez,** Professor and Chair of Leadership, Research, and Foundations—University of Colorado Colorado Springs; **Valerie Conley,** Dean of the College of Education—University of Colorado Colorado Springs; **Kathryn Starkey,** Graduate Research Assistant—University of Colorado Colorado Springs; **Sarah Cooksey,** Graduate Research Assistant—University of Colorado Colorado Springs
POSTER | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Broadening Participation, Course-based Undergraduate Research, Hispanic Serving Institution (HSI)

P-51 Expanding the CURE: Broadening Participation in Course-Based Undergraduate Research

Course-based undergraduate research experiences (CUREs) are an alternative pedagogical approach to the apprenticeship model for high-impact research immersion experiences. CUREs promote similar key learning outcomes and increase STEM retention and success. However, CUREs have the potential to be more inclusive because they are integrated into the curriculum, allowing for broader student participation. The University of La Verne’s W.M. Keck-funded Research Immersion Experience investigators will present findings and innovative methodologies from CUREs across a variety of STEM and associated disciplines. Findings indicate student participation in the CURE courses led to significant learning gains, and improvements in understanding research design. CURE implementers most commonly reported that the strengths of the approach were research experience for students, an increase in students’ confidence, and appreciation of broader relevance.

Christine Broussard, Professor of Biology—University of La Verne; Sarah Dunn, Associate Professor of Kinesiology—California State University, San Bernardino; Kanya Godde, Associate Professor of Anthropology—University of La Verne; Margaret Gough Courtney, Associate Professor of Sociology—University of La Verne; Vanessa Preisler, Associate Professor of Physics—University of La Verne

POSTER | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Institutional Change/Transformation

P-53 Instructional Change Teams: An Exploratory Model

Team-based efforts for improving undergraduate STEM education are becoming increasingly prevalent at higher education institutions across the US. Team-based efforts have higher chances of achieving high quality and long-lasting outcomes compared to individual-driven change but they also face distinct challenges (Weaver et al. 2016). Currently, there is limited literature on team-based collaboration for instructional change work in higher education. We propose a context-specific model that we are developing using a grounded theory approach to examine and interpret the effectiveness of instructional change teams in higher education. We will present the initial model development and describe our ongoing research activities.

Amreen Nasmim Thompson, Postdoctoral Researcher of Physics Education—Texas State University; Alice Olmstead, Assistant Professor of Physics Education—Texas State University; Diana Sachmopazi, PhD Candidate—Western Michigan University; Cynthia Luxford, Assistant Professor of Chemistry Education—Texas State University; Andrea Beach, Professor of Higher Education Leadership & Co-Director of the Center for Research on Instructional Change in Postsecondary Education (CRICPE)—Western Michigan University; Charles Henderson, Professor of Physics and Education—Western Michigan University
POSTER | TYPE IV: STEM EDUCATION RESEARCH

Keywords: Broadening Participation, Communities of Practice, Predominantly Undergraduate Institution (PUI)

P-54  Close Social Subgroup Influence on STEM Degree Persistence at a SLAC

With small liberal arts colleges (SLACs) producing an increased percentage of STEM graduates, whose voice resonates most with STEM degree persistence? Professors? Dad? Best friend? This study investigated undergraduate student perception of close social subgroup influence on their STEM major persistence. STEM majors (N=295) at a midwestern SLAC were surveyed regarding subgroup influence on their motivation toward STEM degree attainment. A hypothesized model was tested to determine the subgroups that STEM majors perceived affected their STEM motivational factors and degree persistence. Results indicated that STEM professors and friends have significant explicit and implicit effects on STEM degree persistence. The model accounted for a significant amount of variance in persistence and STEM interest. Educational implications for college administrators and future research directions are discussed.

Aubrey Whitehead, Perry-Williams postdoctoral fellow in Psychology—The College of Wooster; Jillian Morrison, Assistant Professor, Mathematics & Computer Science—The College of Wooster; Melissa Schen, Director of Educational Assessment—The College of Wooster
WORKSHOP | TYPE I: INDIVIDUAL CLASSROOM/PROJECT-LEVEL INTERVENTIONS

**CS-89** Efficacy of Laboratory Exercises in Achieving Undergraduate Learning

Fully online courses and degree programs are popular with students today. It is important that these courses provide the rigor and value of a traditional learning experience in a face to face classroom in order to ensure mastery of concepts and learning objectives. Online classes typically have suffered due to lack of hands on experiences for the students. One remedy to this is to include simulated hands on work in the course through online laboratory exercises. The belief is that these simulated labs allow students to actively engage in the learning process, thus providing a traditional learning component in the online classroom. This presentation will discuss the effectiveness of online laboratory exercises in enhancing student understanding of core concepts taught in Introductory Astronomy courses.

*Kristen Miller,* Associate Professor, School of Science, Technology, Engineering and Math—American Public University System; *Shelli Carter,* Faculty Director, School of Science, Technology, Engineering and Math—American Public University System

FACILITATED DISCUSSION | TYPE II: INSTITUTION-LEVEL INTERVENTIONS

**CS-91** Quantitative Reasoning Across STEM: Building Institutional Capacity

Quantitative Reasoning (QR) skills are widely recognized as a critical component of higher education in the modern age, and a robust body of research indicates that teaching QR across disciplines improves student learning and confidence. However, many faculty members, even those in STEM disciplines, lack the resources or training to effectively teach QR that is transferable to other contexts. Based on lessons learned from our active NSF-IUSE grant, we will provide evidence that an interdisciplinary faculty learning community is an effective way to develop QR content for STEM disciplines. Participants will experience several activities to develop QR materials in STEM disciplines as well as a roadmap for developing a similar faculty development program at their own institutions.

*Andrea Young,* Vice President for Finance and Associate Professor of Mathematical Sciences—Ripon College; *McKenzie Lamb,* Associate Professor of Mathematical Sciences—Ripon College; *Steve Martin,* Professor of Communication—Ripon College

FACILITATED DISCUSSION | TYPE III: NATIONAL-LEVEL INTERVENTIONS

**CS-92** Elevating Student Experience to Transform STEM Education

Research on learning conditions—such as belonging, identity safety, and growth mindset—that improve student success...
and equity is generating excitement among campus leaders. But how do we apply this scholarship to campus change, particularly now, as students face unprecedented strain and disruption to learning? During this session, you will hear from leading scholars and campuses engaged with the Student Experience Project, a national network seeking to increase equity in college success by transforming student experience. Campus leaders will share ways they are exploring and testing changes to STEM introductory courses to support equity in students’ experience. Participants will be engaged in a dialogue and gain access to resources that support their own work to transform STEM education.

Jennifer Doneh, Senior Director—Coalition of Urban Serving Universities; Kathryn Boucher, Assistant Professor, College of Applied Behavioral Sciences—University of Indianapolis; Lesley Berhan, Associate Professor of Mechanical, Industrial, and Manufacturing Engineering & Associate Dean for Diversity, Inclusion and Community Engagement, College of Engineering—University of Toledo; Lisa Dysleski, Associate Dean for Undergraduate Education, College of Natural Science—Colorado State University; Sushilla Knottenbelt, Senior Lecturer III, Department of Chemistry and Chemical Biology—University of New Mexico

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Hispanic Serving Institution (HSI)**

**CS-93 Intersectionality of Colorism, Colonialism, and the Culture of Science**

In Puerto Rico like in other LatinX cultures, the number of dark-skin professionals in the natural and social sciences is disturbingly low. While we know of a robust literature analyzing the correlations, institutions, and structures of sciences, racism, colorism, and colonialism, the attitudes of individual scientists about race are less known. We conducted a mixed method study to explore and analyze the perceptions and experiences of scientists in Puerto Rico regarding race and colorism in the context of college preparation, professional interactions, and the Island’s current political relationship with the United States. Strategies to fix the problem include acceptance of the African heritage, and the implementation a high-quality anti-racist instructional experience that can be integrated from elementary school up to university levels.

Lilliam Casillas-Martinez, Director of PR-Outstanding & Diversified Undergraduate Program—University of Puerto Rico–Humacao; Rosa Carrasquillo, Professor of Caribbean and Latin American History—College of the Holy Cross; Wilson Gonzalez-Espada, Professor of Physics and Science Education—Morehead State University; Marilu Franco, Faculty at Instituto de Investigaciones Interdisciplinarias—University of Puerto Rico Cayey

**ELIZABETH CITY ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Assessment, Predominantly Undergraduate Institution (PUI)**

**CS-94 Accelerated STEM Courses Result in Lower Learning Retention as Compared to Academic Year Courses**

Learning retention in the accelerated summer course sequence in Organic Chemistry has been assessed and compared to academic year (AY) courses using student performance on the American Chemical Society (ACS) Organic Chemistry Exam at the end of each sequence and after a delay of five months. Results demonstrate that academic year students perform better on the second exam and high-performing summer students have significantly lower retention than comparable academic year students. Those students performed at essentially the same level as low-performing students from both the academic year and the summer. Question analysis comparisons demonstrate distinct learning patterns for the two groups.

Brian McNeils, Associate Professor—Santa Clara University; Matthew Bell, Professor—Santa Clara University; Patricia Simone, Professor—Santa Clara University

**FAYETTEVILLE ROOM**

**FACILITATED DISCUSSION | TYPE IV: STEM EDUCATION RESEARCH**

**Keywords: Minority Serving Institution (MSI), Undergraduate Research, Virtual Learning**

**CS-95 Exploring the Impact of a Pandemic on the Lives of Engineering Students**

In response to the sudden shift to online learning in Spring 2020, a team of researchers conducted an extensive study to evaluate the impact of COVID-19 on engineering students at a large public university in California. Surveys and interviews were given to explore the impact of the pandemic on the learning environment and the personal lives of both students and faculty. The extensive student survey found that students, many of whom are underrepresented minorities, Pell-eligible, and/or first generation, had difficulties with competing priorities, including job loss and family care, challenges with distance learning, including a lack of resources and private study space, and struggles with ineffectual online teaching. Further, students reported feelings of fear, stress, and anxiety, which impacted their academic performance.

Laura Sullivan-Green, Professor and Department Chair—San Jose State University; Patricia Backer, Professor—San Jose State University; Maria Chierichetti, Assistant Professor—San Jose State University; Liat Rosenfeld, Assistant Professor—San Jose State University
Remote Voyages: Constructing Math-Based Inquiry through Model Boat-Building

Join the "Makerspace-Guided Equitable Student Success" (MGESS) team in an exploration of virtual hands-on inquiry that directly aligns with developmental math in the community college setting. Take a voyage of our experimental lab course, Makerspace Mathematics, in building a boat facilitated by a math instructor, an experiential-learning instructor, and a team of peers with the aim of broadening participation for underrepresented minority (URM) community college students. Participants will have the opportunity to engage in a short drafting exercise (known as “lofting”) to create an accurate representation of a boat using materials readily found in a home office (i.e. paper, pencil, ruler). This activity uses scaling, fractions, and graphing and represents the first step to creating a pattern for the side panels of a boat model.

Colin Crane-Smith, Math Faculty Content Facilitator for MGESS—Portland Community College; Peter Crim, Executive Director—Wind & Oar Boat School; Julia Betts, STEM & Design Center Coordinator and Principal Investigator of MGESS—Portland Community College; David Maiava-Hall, Peer Facilitator—Portland Community College

Building an Inclusive STEM Community through Playback Theatre

This workshop will focus on techniques for building an inclusive community using forms of theater. Building inclusive communities within institutions, and particularly within STEM departments, is critical for the retention of underrepresented students, staff and faculty. Playback Theatre utilizes real stories from participants to create an improvised performance, which promotes personal connection and empathy. Themes for stories may include topics such as unconscious bias, bystander awareness, identity (e.g. race, gender, ethnicity, sexual orientation), or feelings of exclusion/inclusion. The workshop will provide the opportunity for participants to share a story and see it acted out, and will also include a guided discussion/reflection about how these techniques could be used in other institutional settings.

Tina Chapman DaCosta, Director of Diversity Theater—Rochester Institute of Technology; Jennifer Connelly, Senior Lecturer—Rochester Institute of Technology; Rita Magalhães, Project Coordinator for Inclusive Excellence—Rochester Institute of Technology; Elizabeth Hane, Associate Professor—Rochester Institute of Technology

Using Cloud for the Impossible

The resources provided by cloud computing are making tasks that once seemed impossible almost routine. See how faculty are helping students solve the world’s biggest challenges with educational programs and curriculum from Google Cloud. In this session we’ll review free cloud credits for classroom use, public datasets, career readiness programs and certifications, plus a look at the new Cloud Computing Foundations Curriculum. Together, these programs are designed to make cloud computing accessible to students, faculty, and researchers tackling our most pressing problems through infrastructure, application development, data science, and machine learning and more.

Laurie White, Professor Emeritus and Developer Advocate, Google Cloud

Keywords: Active Learning, Community College, Peer Mentoring

Keywords: Institutional Change/Transformation

Keywords: Broadening Participation, Institutional Change/Transformation, Professional Development
Cultivating the Imprint in Your Soul

This closing plenary picks up where the AAC&U STEM Conference left off last year. In it, Dr. Fries-Britt talks about the importance of “letting our souls catch up with our bodies.”

Sharon L. Fries-Britt, Professor of Higher Education—University of Maryland, College Park