



PROJECT KALEIDOSCOPE
Advancing What Works in STEM Education

NETWORK FOR ACADEMIC RENEWAL CONFERENCE

TRANSFORMING STEM EDUCATION: Inquiry, Innovation, Inclusion, and Evidence

**Westin Gaslamp Quarter | San Diego, California
October 31 – November 2, 2013**

Greetings!

The Association of American Colleges and Universities (AAC&U) and Project Kaleidoscope (PKAL) welcome you to the Network for Academic Renewal conference *Transforming STEM Education: Inquiry, Innovation, Inclusion, and Evidence*. As the demographic complement of U. S. undergraduate enrollment becomes increasingly diverse and the demand for a skilled STEM workforce increases, it is imperative that STEM higher education develop and implement better STEM pedagogies that are both relevant to diverse audiences and designed to cultivate, as opposed to weed out, academic talent.

STEM learning alone, however, will not address all of the 21st-century challenges that threaten the U. S. position as a global leader. For that reason, PKAL, for nearly two decades, has dedicated itself to empowering STEM faculty. STEM faculty need to be prepared to produce liberally educated STEM graduates and a scientifically literate citizenry. In keeping with this tradition, the themes and topics of this conference are intended to facilitate the sharing of innovations, evidence, and practical strategies that not only ensure all STEM graduates acquire the multidisciplinary knowledge, skills, and mindsets needed to address contemporary challenges, but also succeed in reversing the dramatic loss of talent in STEM disciplines at the undergraduate level and beyond.

Again, we welcome you to the conference and thank you for your participation in *Transforming STEM Education*.

Sincerely,

Susan Albertine

Vice President
Diversity, Equity, and Student Success

Kelly Mack

Vice President, Undergraduate STEM Education
Executive Director, Project Kaleidoscope

PLANNING COMMITTEE

AAC&U extends a special note of appreciation to the individuals and campuses listed below for their many contributions to the conference program.

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Associate Academic Vice President for Undergraduate Education

California Lutheran University

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David J. Marcey
Professor of Developmental Biology

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Faculty Director, Institute for Teaching and Learning and Professor of Chemistry

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Assistant Commissioner for Academic Affairs

FEATURED SESSIONS

Liberal Education and America's Promise

Throughout the conference program, sessions noted with the **Liberal Education and America's Promise (LEAP)** designation highlight the innovative work of colleges and universities that are members of AAC&U's LEAP Campus Action Network. The LEAP Campus Action Network brings together campuses and organizations committed to liberal education; helps them to improve their efforts to ensure that all students achieve essential liberal education outcomes; and shines a spotlight on educational practices that work. Participants in these sessions will learn how members of the network are using the LEAP framework and resources to advance their educational improvement efforts. For information about LEAP visit www.aacu.org/LEAP.

SPONSORS

AAC&U thanks the sponsors below for their generous contribution. Conference sponsors are colleges, universities, associations, nonprofit organizations, and businesses that participate in the program and/or provide financial or in-kind support. Through their contributions, sponsors enhance the conference experience for everyone.

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FRIEND



ACT is an independent, nonprofit organization that provides assessment, research, information, and program management services in the broad areas of education and workforce development. Each year, ACT serves millions of people in high schools, colleges, professional associations, businesses, and government agencies—nationally and internationally. Though designed to meet a wide array of needs, all ACT programs and services have one guiding purpose—helping people achieve education and workplace success.

FUTURE NETWORK FOR ACADEMIC RENEWAL CONFERENCES

February 27-March 1, 2014 ♦ Portland, Oregon

General Education and Assessment: Disruptions, Innovations, and Opportunities

March 27-29, 2014 ♦ Chicago, Illinois

Diversity, Learning, and Student Success: Policy, Practice, Privilege

October 16-18, 2014 ♦ Minneapolis, Minnesota

Global Learning in College

November 6-8, 2014 ♦ Atlanta, Georgia

Transforming STEM Education

For information about Network for Academic Renewal conferences, please see www.aacu.org/meetings/network or contact Karen Kalla or Siah Annand at 202.387.3760

SCHEDULE AT A GLANCE

Thursday, October 31, 2013

- 10:00 a.m. – 7:00 p.m. Conference Registration and Membership Information
- 2:00 – 5:00 p.m. Pre-conference Workshops (*separate registration and fee required*)
- 7:00 – 8:30 p.m. Keynote Address
Persistence in Science by All Students: Lessons from the Little Red Hen and Other Fairy Tales
David J. Asai, Howard Hughes Medical Institute
- 8:30 – 9:30 p.m. Reception

Friday, November 1, 2013

- 7:00 – 8:00 a.m. Breakfast
- 8:00 – 9:00 a.m. Concurrent and Poster Sessions
- 9:15 – 10:30 a.m. Plenary
Metacognition and Motivation: Advancing STEM Learning for All Students
Sandra Yancy McGuire, Louisiana State University
- 10:45 a.m. – 12:00 p.m. Concurrent Sessions, Workshops, and Posters
- 12:00 – 1:30 p.m. Lunch on Your Own
- 1:45 – 5:15 p.m. Concurrent Sessions, Workshops, and Posters
- 5:30 – 7:00 p.m. Community Forum
Advancing Scientific Thinking and Integrative Reasoning Skills: The STIRS Project
Katherine Hunting, The George Washington University; Kevin Hovland, AAC&U

Saturday, November 2, 2013

- 7:00 – 8:00 a.m. Breakfast
- 8:00 – 9:00 a.m. Concurrent Sessions
- 9:15 – 10:15 a.m. Plenary
Institutional Change: An Evolving Revolution That Begins One Voice at a Time
Tuajuanda C. Jordan, Lewis & Clark College
- 10:30 – 11:45 a.m. Concurrent Sessions
- 11:45 a.m. – 12:00 pm. Closing Remarks
Kelly Mack, AAC&U

Join the conversation on Twitter with hashtag #STEM13.

PRELIMINARY PROGRAM OF EVENTS

THURSDAY, OCTOBER 31, 2013

10:00 a.m. – 7:00 p.m. Conference Registration and Membership Information

CALIFORNIA FOYER, SECOND FLOOR

Please stop by the conference registration desk for your program, badge, and membership information.

2:00 – 5:00 p.m. Pre-Conference Workshops

Separate registration and fee required (\$100 members; \$150 nonmembers); participation is limited.

SANTA FE ROOM, SECOND FLOOR

Workshop 1: Technology and Multimedia in STEM Teaching and Learning

Transforming STEM education through the use of integrative, inclusive, and adaptive technologies holds both great promise and significant challenge. While blended learning methods continue to improve student learning, higher education has far to go to understand and advance the most effective approaches to “online” learning. In today’s hyper-connected world, students create, share, and consume digital content frequently. Today’s web is about organizing information (semantics), personalizing information (contextualization), and extracting meaning from information (knowledge-making). It is highly mobile (on demand). Implementing technologies with sound pedagogy requires skilful integration of relevant, often disparate, resources into useful frameworks, enabling learners to interact, explore new situations, and engage scientific reasoning. Workshop facilitators will share effective approaches and best practices, including Universal Design for Learning principles, for implementation and assessment of online and blended learning environments in STEM.

Katherine Kantardjieff, *Dean, College of Science and Mathematics—California State University-San Marcos*; and **Thomas Poon**, *Senior Associate Dean of Faculty and Professor of Chemistry, W.M. Keck Science Department—Claremont Colleges*

CORONADO ROOM, THIRD FLOOR

Workshop 2: Integrating Sustainability and Quantitative Reasoning Across the Disciplines

Workshop facilitators from the National Numeracy Network will share a new approach to applying quantitative reasoning in solving authentic and urgent problems affecting the Earth. Participants will work together in teams to develop activities, projects, and modules that use mathematics and real-world data to investigate and model sustainability topics, including the health of our global commons, the creation and usage of energy, population growth and biodiversity, social justice, and climate change. These and other data-driven topics are designed to engage students actively in the classroom and motivate students to pursue STEM courses and fields of study more deeply.

Caren Diefenderfer, *Professor of Mathematics—Hollins University*; **Eric Gaze**, *Director, Quantitative Reasoning Program—Bowdoin College*; and **Corrine Taylor**, *Director, Quantitative Reasoning Program—Wellesley College*

Sponsored by the National Numeracy Network

PLAZA AB ROOM, SECOND FLOOR

Workshop 3: Effectively Implementing Evidence-Based Active Learning Strategies

Faculty from all disciplines are being asked to reform the teaching and learning of their classrooms to make use of evidence-based instructional strategies that actively and intellectually engage students. In this workshop, participants will gain firsthand experience with methods ranging from rapid feedback assessment techniques to small group collaborative learning activities, all proven to increase the knowledge and abilities of students in classes with enrollments ranging from 10 to 1,000. Participants will also learn about the innovative “learning-assistant” model that (1) helps faculty implement evidence-based instructional strategies; (2) enhances the scientific literacies of underrepresented students; and (3) advances STEM careers.

Edward E. Prather, *Executive Director, Center for Astronomy Education, Associate Professor at Steward Observatory and the Department of Astronomy—University of Arizona*

HARBOR ROOM, THIRD FLOOR

Workshop 4: Enhancing the Role of Faculty as STEM Department Change Agents in the 21st Century

This workshop will advance faculty expertise in promoting department-level STEM education reform at their home institutions. The workshop staff are PULSE (Partnership for Undergraduate Life Sciences Education) Vision and Change

Thursday, October 31

Leadership Fellows, but the topics covered will be relevant to all STEM fields. Workshop participants will actively engage in developing skills and approaches that can be used to effect significant department-level educational change. They will employ self-assessment rubrics to determine their home departments' progress relative to the educational recommendations found in the AAAS/NSF Vision and Change document. Participant-led discussions of barriers to significant STEM education reform will be followed by activities designed to develop student-centered pedagogical "mindsets." Participants will receive resources for Vision and Change implementation and each will develop a specific action plan to enhance their roles as change agents in their departments.

David Marcey, Fletcher Jones Chair of Developmental Biology—California Lutheran University; and **Elizabeth A. Desy**, Professor of Biology, Chairperson, Science Department—Southwest Minnesota State University

7:00 – 8:30 p.m. Welcome and Keynote Address

CALIFORNIA BALLROOM, SECOND FLOOR

Welcome

Kelly Mack, Vice President of Undergraduate Science Education—AAC&U

Keynote Address:

Persistence in Science by All Students: Lessons from the Little Red Hen and Other Fairy Tales

David J. Asai, Senior Director, Undergraduate and Graduate Programs, Science Education—Howard Hughes Medical Institute

Persistence of undergraduates in science fields is of critical importance to the future of our nation. More than just crossing the finish line, our work on persistence should be about adding value to the undergraduate experience, encouraging students to discover new ideas about themselves and science. Persistence in science by all students is poor. Persistence of students from underrepresented ethnic groups is abysmal. Even when factors that affect persistence are the same, minorities leave science at a significantly greater rate than do whites and Asians. Asai will discuss key ingredients to improving persistence in science by all students: (1) what we teach—providing authentic research opportunities for all students early in college; and (2) how we teach—examining the way we think about student development. What are our expectations and how do we define excellence?

8:30 – 9:30 p.m. Reception

SAN DIEGO BALLROOM, FOURTH FLOOR

FRIDAY, NOVEMBER 1, 2013

7:00 – 8:00 a.m. Breakfast

SAN DIEGO BALLROOM, FOURTH FLOOR

Breakfast will be available 7:00- 8:00 a.m. and coffee will be available throughout the day.

8:00 – 9:00 a.m. Concurrent Sessions *See also 8:00 – 9:00 a.m. Poster Session on page 25.*

PLAZA ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 1: Using Deliberative Democratic Exercises to Engage Diverse Undergraduate Students in STEM Learning

Participants will develop an understanding of the benefits, challenges, and opportunities that arise from implementing deliberative democratic small group exercises in STEM classes.

This presentation describes an introductory biology course for nonmajors that employs a deliberative democracy format to engage students in applying newly learned scientific content to real world problems (Gastil and Levine 2005). This model has been used extensively as a public consultation tool in policymaking, and has been suggested as a pedagogical strategy to promote student civic engagement (Michaels et al. 2008, Diaz and Gilchrist 2010). Use of this approach has led to increases in student learning, engagement, and retention, particularly for women and students

from underrepresented minorities. Participants in this session will learn about the class and its pedagogical model, participate in a mini-deliberative democracy exercise, and learn about the results of this action research study. **Liza Finkel**, Associate Professor of Education and Howard Hughes Medical Institute Faculty Fellow—Lewis & Clark College; and **Lisa Weasel**, Associate Professor of Biology and Women, Gender and Sexuality Studies—Portland State University

CALIFORNIA BALLROOM C, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 2: Tapping the Potential of All Students: Integrating Undergraduate Research into the Community College Curriculum

Participants will learn about the importance of engaging students in research-based activities early in the college experience and identify essential introductory research skills.

The Council on Undergraduate Research and the National Association of Instructional Administrators received two NSF grants to work with community colleges to develop undergraduate research programs. Over 100 community colleges have participated in workshops that promote the idea that undergraduate research is a developmental process that needs to begin in the first year of college. Session facilitators will encourage faculty to identify research skills and design a sample course that integrates foundational research skills into general education and introductory courses. **Nancy H. Hensel**, President—The New American Colleges and Universities; and **Kalyn S. Owens**, Professor of Chemistry, and **Ann J. Murkowski**, Instructor—both of North Seattle Community College

SANTA FE ROOM, SECOND FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 3: Understanding Him in STEM: Sharing the Stories of African American Male Scholars in Engineering

Participants will engage with the existing literature about African American males in STEM with particular focus on the role of academic advising in affirming the success identities of African American males in STEM degree programs.

Globalization has confirmed the need for citizens to demonstrate competitive capacities in science, technology, engineering, and mathematics fields. Although more students are entering higher education than ever before, fewer and fewer are enrolling in STEM academic programs. Consequently, the collegiate participation of African American males in STEM disciplines is comparatively lower than other race groups. This session will feature findings from a qualitative study on the success identities of African American men in engineering degree programs at a predominately white institution and discuss the role of the academic advising relationship in providing a pathway to success for students. Advisors and administrators may garner important insight towards planning and programming through the personal narratives of high-achieving African American STEM scholars.

Robert E. Hayes, III, Assistant Dean and Director of Student Affairs—University of Alabama

CORONADO ROOM, THIRD FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 4: Increasing Diversity at the PhD Level: The Fisk-Vanderbilt Master's-to-PhD Bridge Program

Participants will learn techniques developed for recruiting, admitting, mentoring, monitoring and promoting the professional development of underrepresented minority students.

The Fisk-Vanderbilt Master's-to-PhD Bridge Program focuses on increasing the number of underrepresented minorities earning PhDs in astronomy, biology, chemistry, materials science, and physics. The program combines a family atmosphere and caring mentors with high-level research. Students spend the first two years of the program enrolled at Fisk University as they work toward the Master's degree, with access to instructional and research opportunities at Vanderbilt. The program has enrolled 65 students since it began in 2004 and to date, every student who has successfully completed the bridge program requirements has been offered admission to the Vanderbilt PhD program. Several students have chosen to continue to PhD programs at other top institutions. Students, whether at Vanderbilt or elsewhere, are supported to the PhD and beyond. They receive assistance with presentations, qualifying exams, and thesis and defense preparation, as well as mentorship, networking opportunities, job talks and job placement. Session participants will leave with specific tools they can adapt and incorporate at their institutions to improve efforts to increase underrepresented minority participation and retention in STEM fields.

Dina Myers Stroud, Executive Director, Fisk-Vanderbilt Master's to PhD Bridge Program, Research Assistant Professor in Physics and Medicine, Vanderbilt University

Friday, November 1

HARBOR ROOM, THIRD FLOOR

CS 5: AAC&U: A Newcomers' Welcome and Introduction to LEAP—Liberal Education and America's Promise

Participants will learn the who, what, why, and where of AAC&U and the LEAP initiative, and how the LEAP vision for learning serves as a useful overarching framework for undergraduate learning.

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 or intended career. In this session, participants will learn how AAC&U's four broad goals for student learning (1) *LEAP: Liberal Education as a Global Necessity*; (2) *Quality: 21st-Century Markers for the Quality of US Degrees*; (3) *Equity: Innovation, Inclusive Excellence, and Student Success*; and (4) *Social Responsibility: Integrative Liberal Learning and the Global Commons* and its LEAP initiative provide both context and framework for the undergraduate experience.

Kevin Hovland, Senior Director of Global Learning and Curricular Change—Association of American Colleges and Universities

CALIFORNIA BALLROOM A, SECOND FLOOR

CS 6: HEDs Up—National Numeracy Network

This session will include three presentations followed by time for questions and discussion.

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

The National Numeracy Network: An Informational Session

The National Numeracy Network (NNN) promotes education that integrates quantitative skills across all disciplines and at all levels. Towards this goal, the network supports faculty development, curriculum design, assessment strategies, education research and systemic change. The network is the professional organization serving and promoting collaborations among those students, educators, academic centers, educational institutions, professional societies, and corporate partners sharing our vision. The network also strives to keep issues of quantitative literacy at the forefront of national and international conversations about educational priorities. Members of the NNN will share information on various activities and projects of the organization, including the NNN open-access journal, *Numeracy: Advancing Education in Quantitative Literacy*.

Caren Diefenderfer, Professor of Mathematics—Hollins University; **Eric Gaze**, Director of the Quantitative Reasoning Program—Bowdoin College; **Corri Taylor**, Director of the QR Program—Wellesley College; and **Nathan Grawe**, Associate Professor Economics—Carleton College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Should a Quantitative Reasoning Foundations Course Satisfy a Prerequisite for Mathematical Proficiency?

A college remedial math course reviews and instructs on concepts that students have often been exposed to multiple times, usually without meaningful context. These courses stand as the gatekeepers for many majors and career paths, as well as degree completion. Yet even students who pass through the gate struggle to transfer skills to subsequent courses. A quantitative reasoning course that emphasizes algebraic thinking, modeling, and appropriate uses of technology can meet the same need as the remedial math course and better equip students to problem solve, think critically, and effectively communicate quantitative ideas.

Margot Black, Math Skills Center Director—Lewis & Clark College

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

Quantway®: Carnegie's Networked Improvement Community Approach to Mathematics

The Carnegie Foundation for the Advancement of Teaching created the quantitative reasoning course Quantway® as an alternative to the traditional beginning algebra and intermediate algebra developmental math courses found at most community colleges. This mathematics pathway has proven to provide three times the success in half the time for getting students through their math requirements in order to pursue a college degree. A large part of this success can be credited to the use of a Networked Improvement Community (NIC) working around a common problem to develop and improve the quantitative reasoning curriculum, faculty teaching abilities, and associated support tools. The facilitator will describe the Quantway® pathway and the varied aspects of our NIC. She will also argue and provide evidence that such a community is important for sustained work on an educational reform project.

Cinnamon Hillyard, Senior Associate, Director of Network Development and Relations—Carnegie Foundation for the Advancement of Teaching

9:15 – 10:30 a.m.**Plenary**

CALIFORNIA BALLROOM, SECOND FLOOR

Metacognition and Motivation: Advancing STEM Learning for All Students*Sandra Yancy McGuire, Assistant Vice Chancellor and Professor of Chemistry, Louisiana State University*

Many learners today seem more focused on becoming credentialed, and less concerned with gaining a deep understanding of the concepts and principles taught in their courses. At the same time, faculty may find it challenging to provide engaging learning activities for students who present a wide range of interests and levels of college readiness. Enhancing undergraduate STEM learning, particularly for underrepresented students in both STEM and non-STEM majors, begins with a clear understanding of how students learn and what motivates them to learn. McGuire will address how educators can nurture a desire to think critically and teach metacognitive learning strategies that will advance STEM knowledge, skills, and careers for all students.

10:45 a.m. – 12:00 p.m.**Concurrent Sessions***See also 10:45 a.m. – 12:00 p.m. Poster Session on page 27.*

CALIFORNIA BALLROOM A | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 7: Using Big Problems to Reveal the Big Picture

Participants will examine active learning models appropriate to first-year college students and learn strategies for course development around a central theme or big problem.

This workshop will share how the complex, multidisciplinary problems of malaria and antibiotic resistance are used at two institutions to engage first-year students in building targeted learning outcomes. Like the students, participants will work in teams in a flipped classroom format to explore activities designed to build foundational content knowledge, quantitative skills, written and oral communication, critical and creative thinking, collaboration, and shared responsibility for the success of their peers. The facilitators will also share a multifaceted assessment of learning outcomes, and how assessment evidence is used to continuously improve their courses.

Ellen S. Goldey, Kenan Professor and Chair of Biology—Wofford College; and April Hill, Professor of Biology, Integrated Quantitative Science Co-Coordinator and Denoon Professor of Science—University of Richmond

CALIFORNIA BALLROOM B | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 8: The Importance of Mentoring Underrepresented Minorities through Transitions in STEM Educational Pathways

Participants will review effective practices related to mentoring, preparation, transitions, and programs that have been successful in helping underrepresented minority (URM) students persist in STEM educational pathways and learn how to create a coherent framework to adopt in their work.

This session will share a project that links the resources of three professional societies to develop innovative initiatives that address retention of URM undergraduate, graduate students, and postdoctoral researchers during key transitions in their educational and career pathways. Although each of these transitions is unique, research identifies three shared strategies that significantly improve persistence across these transitions: (1) access to financial resources; (2) peer support; and (3) a supportive professional network. Individuals from the Council on Undergraduate Research and the Leadership Alliance Program will discuss how they synthesized their organizational strengths to create an innovative and sustainable framework that supports URMs as they progress through their academic pathways.

Mary Crowe, Associate Provost of Experiential Education—Florida Southern College; and Medeva Ghee, Executive Director—The Leadership Alliance

CORONADO ROOM, THIRD FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 9: Implementation and Outcomes of High-Impact Practices across STEM Disciplines at an HBCU

Participants will learn about the planning and implementation of two programs that have improved retention of URM undergraduates in STEM majors and work on developing ideas and plans for their institution.

Friday, November 1

Delaware State University, an HBCU, has focused attention on retention and degree completion of STEM majors. Funding provided by NSF HBCU-UP and NIH RISE grants has allowed Delaware State to implement best practices to support these goals. The interventions used in both programs involve (1) peer mentoring; (2) peer-led team-learning in gatekeeper courses; and (3) involvement of undergraduates in long-term laboratory research projects. Each program applies these interventions in different ways and affects different but overlapping student populations. The facilitators have examined retention in the major, gatekeeper course success, and success in subsequent courses and will discuss their methods, the programs' impact, and ways to translate the programs into other educational contexts. **Andrew D. Lloyd**, Associate Professor of Biological Sciences, **Cynthia van Golen**, Associate Professor of Biological Sciences, **Margie R. Vela-Sianjina**, SMILE Assistant Projector Director, and **Rashida Z. Davis**, RISE Program Coordinator—all of Delaware State University

CALIFORNIA BALLROOM C | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 10: Leveraging Diversity in Teams/Groups for STEM Learning

Participants will leave the workshop with a full curriculum for a five-week course on intergroup relations and will learn how the course is evaluated by an instrument measuring student outcomes.

This workshop will present a multidisciplinary collaboration between the School of Engineering and the Program on Intergroup Relations at the University of Michigan that has produced an intergroup relations course within the school's summer M-Stem Academy for incoming engineering students. The session will include an overview of the curriculum to be conducted in three groups, each led by one of the session facilitators to maximize questions and discussion. The session will also present results from the summer 2013 evaluation of the course, and a practicum in which participants will practice specific in-class activities that demonstrate the impact of personality and social identity in groups and teams, approaches to dealing with conflict in groups and teams, and the role of culture in engineering practice. The course is aimed at improving the learning climate for students, especially students from groups that are underrepresented in the STEM fields.

Patricia Gurin, Professor Emerita, Psychology, **Monita Thompson**, Co-Director, Program on Intergroup Relations, **Joanna Millunchick**, Academic Director, M-Stem Academy, School of Engineering, and **Loren Lee**, Student—all of University of Michigan

SANTA FE ROOM, SECOND FLOOR | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 11: Creating a STEM Faculty Fellows Community: Developing Collaboration through Facilitation

Participants will develop a basic understanding of the Creative Scientific Inquiry Experience (CSIE) faculty development model by learning about its design, implementation, and results.

Faculty development is a key to increasing the number of undergraduate majors and graduates in STEM fields. For those working in faculty development roles, facilitation is much more about the process of the participants' experiences than it is about conveying a certain body of knowledge or a set of skills. There is no right way to lead a group of STEM faculty, but there are some approaches that have been more effective than others for STEM faculty professional development. This workshop presentation is based on the successful Creative Scientific Inquiry Experience (CSIE) Faculty Fellows Institute. This hands-on workshop will provide tools for creating a faculty learning community by generating an atmosphere of collaboration, offering activities to encourage this collaboration, teaching academic service-learning skills, and partnering with the community to develop interdepartmental STEM community-based experiential seminars.

Ellene Tratras Contis, Professor of Chemistry and Director of the CSIE Program—Eastern Michigan University

PLAZA ROOM, SECOND FLOOR | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 12: PULSE: Transforming Life Sciences Education

Participants will learn about PULSE and how STEM faculty may become involved in Vision and Change initiatives.

The Vision and Change call to action document produced by the American Association for the Advancement of Science (AAAS) and the NSF provides a compelling argument for important but daunting change in life sciences education. The Partnership for Undergraduate Life Sciences Education (PULSE), a collaborative effort by the NSF, the National

Institutes of Health/NIGMS, and the Howard Hughes Medical Institute, seeks to stimulate that change—transformation at the departmental level in the diverse institutions of the broader life sciences community. For the past year, PULSE Fellows have worked to develop approaches to raise awareness about the need for change, provide departments with tools for self-evaluation, support faculty members seeking to transform their own courses and pedagogies, and promote departmental change through working visits by Vision and Change Ambassadors.

David J. Marcey, Fletcher Jones Chair of Developmental Biology—California Lutheran University; and **Elizabeth (Betsy) A. Desy**, Professor of Biology, Chairperson, Science Department—Southwest Minnesota State University

HARBOR ROOM, THIRD FLOOR

CS 13: HEDs Up—National Numeracy Network

This session will include four presentations followed by time for questions and discussion.

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Quantitative Reasoning Activities: What Faculty Emphasize and How Students Take Action

Society and employers in the modern workforce demand graduates with quantitative reasoning skills. This session will share the results of a study using data from the 2013 administration of the Faculty Survey of Student Engagement to explore disciplinary differences in faculty members' emphasis on quantitative reasoning activities. Participants will see how those activities relate to the broader skills and abilities that faculty want their students to develop. Session facilitators will discuss how the study used data from the 2013 administration of the National Survey of Student Engagement to examine how much time students report spending on quantitative reasoning activities and how that relates to their faculty's emphasis. When exploring the relationship between over 14,000 faculty and nearly 41,000 students at 121 institutions, a statistically significant, positive relationship was found between students and faculty members of the same discipline at the same institutions. Results also suggest differences in faculty emphasis and student quantitative reasoning activities by discipline and key student and institutional characteristics.

Amber D. Lambert, Assistant Research Scientist, and **Louis M. Rocconi**, Assistant Research Scientist—both of Indiana University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Illuminating Scientific Values and Promoting Scientific Inquiry through Quantitative Reasoning

Although quantitative reasoning can be thought of as a tool of science and located in a requirement structure as such, quantitative reasoning also embodies a set of values including empirical inquiry, measurement, systematic comparisons, participation in scholarly discourse, and replication that are at the heart of science. Thus, education in quantitative reasoning can serve as a means of introducing students to scientific values and of motivating further study of science. This presentation will detail how an introductory interdisciplinary course designed to strengthen students' quantitative reasoning serves such a role in a liberal arts curriculum.

Neil Lutsky, Kenan Professor of Psychology—Carleton College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Comparing Quantitative Reasoning (QR) Attitude Outcomes across Courses Varying in QR Focus

One focus of QR instruction is changing student attitudes, such as reducing levels of "math self-doubt" (MSD) and enhancing belief in the "usefulness of numerical information" (UNI). Over four semesters and with support from the Teagle Foundation, the QUAD Center at Willamette University helped develop and implement QR instructional components in a range of STEM courses as well as in other courses traditionally lacking a central QR focus (e.g., art history). As expected, students enrolled in low QR types of classes had higher MSD and lower UNI scores at pretesting than did students in high QR courses. By semester's end, however, MSD scores declined and UNI scores increased for students in low QR courses. Their mean MSD and UNI scores at post-test were virtually identical to those of students in high QR courses, who did not show statistically significant change over the term. The presenters will discuss a variety of interpretational and methodological issues in measuring attitudes, aggregating data across modules and courses, and interpreting such pre-post changes.

James Friedrich, Professor of Psychology, and **Kelley Strawn**, Professor of Sociology—Co-Directors of the Center for Quantitative Understanding, Analysis, and Design at Willamette University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Investigating and Improving the Quantitative Literacy of Undergraduate Science Students

Introductory science courses are a natural venue for cross-curricular application of numerical skills, and they provide a forum to help students see real-world applications of mathematical thinking. As such, they are an important place to

Friday, November 1

strengthen and reinforce students' basic quantitative literacy and work to overcome student math anxiety. The presenters will describe two projects involving the assessment of undergraduate students' quantitative literacy skills and attitudes towards math and will discuss implications and lessons learned. The projects demonstrate that it is possible to improve both skills and attitudes through conscious incorporation of numerical thinking and quantitative approaches in introductory science courses.

Kate Follette, Doctoral Student, and **Susan Hester**, Postdoctoral Scholar—both of University of Arizona

12:00 – 1:30 p.m.

Lunch on Your Own

1:45 – 2:45 p.m.

Concurrent Sessions

See also 1:45 – 2:45 p.m. Poster Session on page 29.

CALIFORNIA BALLROOM A | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 14: Collaborative Learning Environments

Participants will gain awareness of the spectrum of flexible, collaborative learning environments beyond classrooms or laboratories as well as strategies for designing learning spaces relevant to STEM curriculum.

The creation of effective, team-based learning environments is critical to the evolution of learning space design. STEM courses are quickly moving away from the dominant lecture-based pedagogy, and the current inventory of classrooms and laboratories are not always adequately flexible to meet this change. This dynamic and interactive session will focus on co-exploring the merits and disadvantages of innovative learning spaces that merge these often distinct space types into new hybrids, creating spaces where faculty can innovate and promote active, engaged learning.

Kip Ellis, Principal/Academic Planning and Design, and **Elissa Kellett**, Project Executive, Principal—both of EYP; and **Jill C. Sible**, Assistant Vice President for Undergraduate Education and Professor of Biological Sciences—Virginia Polytechnic Institute and State University

Sponsored by EYP

PLAZA ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 15: Developing Students as Scholars

Participants will learn how a research-based pedagogy works by examining a scaffolded curriculum designed to prepare all undergraduates for a mentored research project in the senior year.

The College of Wooster has, over a period of more than sixty years, developed a rigorous program of study that culminates with a senior research experience. The Senior Independent Study Project requires seniors to become explorers and co-creators of knowledge, as they progress through a year-long research project working one-on-one with a faculty member in their major discipline. This experience is not restricted to those in an honors program, but rather is required of all students. This Senior I.S. has shaped the college's curriculum, and has effectively created a "culture of research" that guides how faculty members teach introductory and mid-level courses. The presenters will describe how students are prepared for Senior I.S. using a research-as-pedagogy approach across all four years and explain the incredible value of bringing students of all levels through this process. Participants will leave with specific activities and assignments, as well as a list of resources for locating additional ideas in STEM disciplines.

Pamela Pierce, Professor of Mathematics, **Amy Jo Stavnezer**, Associate Professor of Psychology and Neuroscience, and **Judith Amburgey-Peters**, Professor of Chemistry—all of the College of Wooster

CALIFORNIA BALLROOM B | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 16: Identifying and Nurturing the Latent STEM Talent of First-Generation College Students

Participants will identify hurdles for first-generation college students in undergraduate STEM fields and learn of a theory-driven, student-centered model designed for retention and persistence.

This session focuses on developing a STEM program that pays particular attention to the academic, social, and cultural obstacles faced by first-generation college students in persisting with and graduating from college with a STEM degree. The session facilitators will address how Southern New Hampshire University (1) designed a new mathematics program for all students with an emphasis on a sizable population of first-generation college students; (2) designed effective in-house recruitment strategies for mathematics majors and minors that speak to first-generation college students; and (3) built a mathematics community that is inclusive of first-generation college students. The facilitators represent three different segments of professional university life—student support services, faculty, and

administration—and will address challenges they faced as well as successes they realized in identifying and nurturing the mathematical talent of first-generation college students at their regional university.

Susan D'Agostino, Assistant Professor of Mathematics and Math Major Program Coordinator, **Patricia Lynott**, Provost and Senior Vice President of Academic Affairs, and **Kathy Willis**, Math Tutoring Program Coordinator—all of Southern New Hampshire University

CALIFORNIA BALLROOM C | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 17: An Innovative Seminar Course Model for Underrepresented STEM Undergraduates

Participants will gain an understanding of the Scholars Academy STEM program model and its longitudinal support and effectiveness, including detailed overviews of seminar courses.

The Scholars Academy College Success Program Seminar Course is in its fourth year and is offered for freshmen and new transfers. The goals of the program include (1) building a cohort community of learners, thereby increasing retention; (2) providing first-generation STEM students foundational reading, writing, presentation skills, and knowledge/skill of applied research, thereby enabling a visioning process of advanced graduate work for minority students; and (3) building leadership skill sets through teamwork and service learning, thus building self-sufficiency, confidence, and capacity for the rigors of university academics and STEM careers. The presenter will share data from post-course assessments and discuss methods of fast-tracking transfers into research.

Mary Jo de Garcia Parker, Director of Scholars Academy—University of Houston—Downtown

SANTA FE ROOM, SECOND FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 18: University-High School Collaboration for Recruitment and Preparation of Underrepresented Minority Students

Participants will become familiar with innovative strategies to prepare low-income, first-generation, minority students for success in college and STEM-related fields and understand how to initiate and sustain a collaborative college preparatory program for high-school students from under-resourced communities.

Session facilitators will describe a hands-on, problem-based, college-level urban ecology curriculum designed to meet the needs of high school students from under-resourced urban communities. This program is delivered through a four-year summer academic "boot camp" which immerses urban minority students in science, geospatial technology, mathematics, statistics, and language arts. The goal of this program is to support the success of low-income, first-generation, minority students. The final two summers offer college credit for science and statistics in support of increasing minority participation in STEM careers. A unique feature of this program is co-teaching among university faculty and high school teachers. University faculty also collaborate online with partner-school teachers and students during the bridging academic year to transfer understanding of rural ecology issues to urban environments.

Nathan R. Lien, Assistant Professor of Chemistry, **Jane M. Anderson**, Associate Director, First-Generation Initiative and Director of Countdown to College, and **Joshua J. Lallaman**, Assistant Professor of Biology—all of Saint Mary's University of Minnesota

CORONADO ROOM, THIRD FLOOR | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 19: Professional Learning Communities: Advancing Faculty Innovation in STEM

Participants will identify the advantages of a professional learning community, recognize strategies in organization and facilitation, and create a plan for implementing learning communities for STEM faculty at their institutions.

Professional Learning Communities (PLC) for faculty are growing in popularity at colleges across the country. The shared learning opportunities of a PLC are an ideal format for a cross-disciplinary cohort of STEM faculty members. The Community College of Baltimore County, with the support of NSF and the National Alliance for Partnerships in Equity (NAPE), has integrated PLCs into their formal professional development program for STEM faculty. The rationale for using learning communities is to reinforce content learned during an intensive training by providing regular, ongoing professional development so that faculty can integrate and implement the new material. Faculty have examined issues in their own classes, explored strategies, and developed clear interventions to increase student retention and performance. The presenters will share strategies for organizing and facilitating an interdisciplinary PLC that resulted in transformative impact on the faculty and led to a direct impact on their students.

Terese E. Ebersole, STEM Liaison and Professor of Biology, and **Sonja A. Schmitz**, Professional Learning Community Facilitator and Assistant Professor Biology—both of the Community College of Baltimore County

Friday, November 1

HARBOR ROOM, THIRD FLOOR | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 20: Harnessing the Power of State Systems and Consortia to Enhance STEM Education at the Institutional Level

Participants will consider broad issues and common challenges associated with institutionalizing high-impact practices in STEM.

It can be a great challenge to move a new initiative from concept to practice at the departmental level and the challenges are accentuated when the practice is moved to the institutional level. Moving beyond the institutional level to the state system or consortium level increases the complexity exponentially. The Council on Undergraduate Research is working with six state systems and public and private consortia to improve the quality of STEM education at each of their constituent campuses by focusing on institutionalizing undergraduate research, scholarship, and creative activity within each system. Using case studies, panelists will discuss how the culture of each system/institution helps shape the programs that are adopted. The session will include what has worked, current challenges, ongoing implementation issues, and lessons learned. Assessment data will be discussed.

Mitchell Malachowski, Professor of Chemistry—University of San Diego; and **Kerry Karukstis**, Professor of Chemistry—Harvey Mudd College

3:00 – 4:00 p.m. Concurrent Sessions

CALIFORNIA BALLROOM A | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 21: Flipped, Blended, and Online: Engaging Our Students in New Environments

Participants will choose an alternative format (flipped and/or blended) lesson to try when they return to campus.

Research suggests that improving students' hands-on experience with math and science increases their perseverance and their understanding. Students who use computers in school and at home show better outcomes in science learning. Flipped classrooms (where lectures happen outside of class) and technology within the classroom can help students access material in new ways—or can they? The presenters will introduce the technique of flipping the classroom and blending online and face-to-face teaching. The session will focus on sharing available tools and practices among participants with the goal that all participants will leave with a framework for trying these new techniques in their own classrooms. Discussion around working with students with disabilities and thinking about universal design for learning principles will be included.

Anita M. Long, Assistant Professor of Mathematics—Landmark College; and **Alison Pechenick**, Senior Lecturer in Engineering—University of Vermont

CALIFORNIA BALLROOM B | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 22: Transforming Nonmajors to Majors through Real-World Capstone Learning Projects

Participants will apply backward design methodology to create an outline for their own course redesign and examine effective practices for a large real-world, collaborative project that engages students and encourages them to consider majoring in STEM areas.

Too often, general education science classes are seen as just something for students to get through. Learn how biology faculty used inquiry to redesign their course with real-world projects, including a capstone crime scene investigation project that involved over 300 students and in the process increased student engagement, success, and interest in STEM majors. Participants will learn how the project themes as well as the pedagogical approaches used are particularly effective with the large number of underrepresented minority students who typically enroll in this course.

Katie Rodriguez, Instructor of Biology, **Jackie Duvall**, Adjunct Instructor of Biology, and **Diane Livio**, Adjunct Instructor of Biology—all of Pasadena City College

SIERRA ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 23: Connecting Science Learning for Future Elementary Teachers

Participants will develop a clear understanding of the importance of providing future elementary teachers with an enhanced STEM learning experience, particularly in the context of Next Generation Science Standards and Common Core State Standards.

The presenters are involved in the development and implementation of a cross-disciplinary, four-course STEM Concentration in Liberal Studies at California State University–Fresno. Liberal Studies majors typically enter the credential program for elementary teaching, but interest from this group of students in science courses beyond what is required has been limited. The STEM Concentration affords a transformative science learning experience for future elementary teachers through deliberately designed integrative courses with shared purposes of (1) increasing interest in and generating excitement for teaching and learning science; (2) providing coherent and connected science learning opportunities; (3) modeling research-based and inquiry-oriented science pedagogy; and (4) facilitating awareness of the science and engineering practices, crosscutting concepts, and disciplinary core ideas of the Next Generation Science Standards. This session will share the presenters' approach to the design of these connected courses and plan for multidisciplinary faculty collaboration and professional development.

Frederick Nelson, Assistant Professor of Science Education, **Carol Fry Bohlin**, Professor and Special Assistant to the Provost for STEM Initiatives and Director, Mathematics and Science Teacher Initiative, and **Mara Brady**, Assistant Professor of Earth and Environmental Sciences—all of California State University–Fresno

SANTA FE ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 24: Competency-Based Reforms of the Undergraduate Biology and Premedical Curriculum

Participants will gain a better understanding of what a competency-based curriculum entails, how it can be developed, and how developing competencies can be assessed.

This session will provide an overview of undergraduate curriculum reforms inspired by the competency-based framework of the Howard Hughes Medical Institute-American Association of Medical Colleges report titled Scientific Foundations for Future Physicians. The presenters will share instructional materials and approaches for assessing competency development and will engage participants in a discussion of the challenges of implementing a competency-based curriculum. Participants will also learn of opportunities to build collaborations with other institutions engaged in premedical curriculum reform.

Katerina Thompson, Director of Undergraduate Research and Internship Programs—University of Maryland College Park; **Michael Gaines**, Professor and Assistant Provost of Undergraduate Research and Community Outreach—University of Miami; **David Sanders**, Associate Professor of Biological Sciences—Purdue University; and **William LaCourse**, Dean of the College of Natural and Mathematical Sciences—University of Maryland Baltimore County

PLAZA ROOM, SECOND FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 25: Supporting STEM Student Success through Embedded Remediation with the Math You Need, When You Need It

Participants will consider issues of mathematical preparedness and how existing tools can be leveraged to adapt embedded remediation to STEM contexts.

This session challenges the effectiveness of prerequisite mathematics courses in remediating required quantitative skills in introductory science courses. It suggests instead that embedded mathematics remediation using online technology tailored to a specific science context is a viable alternative that promotes transfer of learning and access to key quantitative content. Furthermore, embedded remediation increases student access to introductory science courses by removing fiscal and temporal barriers imposed by prerequisite mathematics courses. Data supporting these empirical claims derive from research on students and faculty in forty-three introductory geoscience courses employing “The Math You Need, When You Need It” online modules.

Helen E. Burn, Instructor of Mathematics, Director of Curriculum Research Group, and **Eric M.D. Baer**, Instructor of Geology—both of Highline Community College

HARBOR ROOM, THIRD FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 26: Engaging Undergraduate Minority Students in STEM through Research-Based Learning

Participants will gain knowledge on how to actively engage students in STEM learning through problem-based inquiry and hands-on biological research, including an innovative strategy in teaching and introducing research concepts to students with no research experience in STEM.

The 400 student Department of Biology at North Carolina A&T State University, the largest HBCU in the North Carolina system with 11,000 students, faced the dilemma of engaging and retaining students in the sciences. Pilot studies with students in research training programs demonstrated that undergraduate research was a catalyst for engagement.

Friday, November 1

Using inquiry-based research as the cornerstone for curriculum change, faculty remapped the curriculum and designed the Introduction to Research course (Bio200). This sophomore-level course addresses student learning outcomes including critical thinking, scientific literacy, and written and oral communication. Data shows that this course helps to build and sustain an interest in the sciences by helping all students understand the research process, become engaged in independent research, and improve science literacy and communication skills. This session will include a review of course structure, learning outcomes, and samples of students' products followed by discussion.

Catherine Dinitra White, Associate Professor of Biology, **Jian Han**, Assistant Professor of Biology, and **Mary Smith**, Professor and Chair of Biology—all of North Carolina Agricultural and Technical State University

CORONADO ROOM, THIRD FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 27: Utilizing Case-Based Learning in a Summer Pre-Freshman Bridge Program to Impact STEM Retention Rates

Participants will examine the design of a summer bridge program that incorporates case-based learning and community building including current research data on the program.

Numerous reports call for universities and colleges to improve student engagement and the success rate of students transitioning to college, especially in STEM disciplines. A recent NSF STEP grant has allowed the Center for Science Education at Emory University to develop a unique summer bridge program incorporating both residential and online instructional models using case-based learning, science writing, course advising workshops, mathematics diagnostics/tutoring, and guided self-assessment activities. Program data indicates students' (n=33) confidence, analytical and communication skills increased during the three-week bridge program. Discussion will include how to build on this success by refining the program and scaling up to include all incoming pre-freshman.

Drew Kohlhorst, Associate Director, Center for Science Education—Emory University

CALIFORNIA BALLROOM C | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 28: The Stanford STEM Initiative: Intentional Design to Ameliorate STEM Pipeline Attrition

Participants will gain strategies for creating fully integrated programs that highlight both academic and social belonging, not sacrificing one for the other, and learn how to create a research design that will benefit the program.

The challenges of underrepresented groups in STEM fields in higher education are well documented (PCAST, 2010). In efforts to be proactive about this situation at Stanford, recent endeavors have coalesced to make a strategic plan to facilitate students through the STEM pipeline. Combining the Leland Scholars Program (a three-week, comprehensive, pre-college summer institute for incoming freshmen) with the Chemistry Companion Series (a yearlong problem-solving based sequence that runs concurrent to first-year chemistry courses), Stanford has created a system to help retain students from under-resourced backgrounds in STEM fields. The Stanford STEM Pipeline Initiative treats participation as an honorific. This encourages student participation, bringing them into a program that simultaneously addresses their lack of preparation while helping them to feel fully enfranchised at the university. Preliminary assessments suggest that this intentional pipeline ameliorates the sharp attrition seen in other students.

Warren Chiang, Director of the Leland Scholars Program and Stanford STEM Fellows—Stanford University

4:15 – 5:15 p.m.

Concurrent Sessions

See also 4:15 – 5:15 p.m. Poster Session on page 33.

CORONADO ROOM, THIRD FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 29: Implementing and Evaluating an Interdisciplinary STEM Summer Research Institute

Participants will gain insight into processes used to enhance the STEM-readiness of underserved students through an intensive summer research experience.

California State University– Channel Islands has implemented a STEM-based interdisciplinary Summer Research Institute (SRI) engaging sixty Hispanic community college students in authentic research experiences. This was an intensive four-week immersion experience in which participants (1) took upper-division interdisciplinary STEM courses; (2) conducted research with faculty mentors; (3) conducted research on the Tall Ship Bill of Rights; and (4) participated in academic and career-preparation sessions. The program was developed to assist Hispanic and low-income students in their development of critical STEM skill sets. These included critical thinking, analytical reasoning, scientific literacy, and interdisciplinary communication. This presentation focuses on the SRI and the design and results

of its comprehensive evaluation. Participants will examine a framework for evaluating complex and multifaceted interventions by focusing on intended proximate and distal outcomes.

Harley E. Baker, Professor of Psychology, and **Connie Baker**, Research Coordinator, Project ACCESO—both of California State University—Channel Islands

SANTA FE ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 30: Features and Practices of Successful Calculus Programs: Insights from Case Studies at Seventeen Institutions

Participants will learn about the programs and practices that can contribute to making a calculus program successful in different types of institutions.

Students often leave STEM majors because of poor instruction in their mathematics and science courses, with calculus frequently cited as a primary reason. While calculus is not the only hurdle that potential STEM graduates face, it is one of the most challenging obstacles. In order to develop successful retention strategies, the field is in need of a deeper understanding of the characteristics of successful programs in college calculus. This session will report on case studies at seventeen different institutions with demonstrably successful calculus programs, including two-year colleges, undergraduate institutions, master's degree-granting institutions, and research universities. Panelists from the case study teams will describe the characteristics of these successful calculus programs, including practices such as attending to and making use of local data, placement policies, coordination of calculus instruction, learning or tutoring centers, teaching practices, and undergraduate or graduate teaching assistant training.

Chris Rasmussen, Professor—San Diego State University; **Eric Hsu**, Director, Center of Science and Math Education—San Francisco State University; **Helen Burn**, Director, Curriculum Research Group—Highline Community College; and **Kate Melhuish**, Graduate Research Assistant, Fariborz Maseeh Department of Mathematics and Statistics—Portland State University

PLAZA ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 31: New Techniques in Writing and Multimodal Composing: Helping Students Integrate Learning

Participants will learn techniques for designing writing assignments that deepen student learning and integrate genres from other fields. Multimodal composing and peer response will be highlighted.

This session will share three examples that demonstrate how writing assignments and multimodal student composing (e.g., video) can deepen STEM learning and help students. The first example comes from an Introduction to Biotechnology course enrolling 150 students. The course goals are to teach principles, technologies, and products of biotechnology and apply this knowledge to develop and market a novel biotechnological product with the writing assignment of developing a business plan. The plans are progressively written with weekly exercises and instructor feedback and completed plans systematically peer reviewed. The second example presents creative writing assignments in large chemistry lecture classes to personalize learning and improve conceptual understanding through peer- and self-explanation strategies. One such assignment allows students to create video scripts about organic chemistry concepts and describe how they would teach them via YouTube. The final example, from a Writing in Science course, is a "Popular Science Project" that asks students to use diverse media and publication formats to translate research reviews for nonscientist audiences of their choice. Participants will be prompted to adapt ideas to develop a writing assignment for a course of their own.

Chris Thaiss, Clark Kerr Presidential Chair and Professor, University Writing Program, **Annaliese Franz**, Associate Professor of Chemistry, and **John Yoder**, Professor of Plant Sciences—all of University of California—Davis

HARBOR ROOM, THIRD FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 32: Education for a Cyber-Capable Citizenry: From Majors to Nonmajors, from Ethics to Understanding

Participants will see examples of collaborative assessments and how these were fundamental to the pedagogical approach used in lectures and labs in a large, pilot nonmajors course.

This session will report on two courses designed to reach all students, to educate a cyber-capable and literate citizenry, and to increase and sustain interest in computer science. These courses, which relate to the world students know, form a sequence known as "The Technical and Social Foundations of the Internet." The first is a writing-intensive seminar to engage majors. The second is a large, lab-based, cyber-fluency course for nonmajors using the big

Friday, November 1

ideas of computer science. Both courses are grounded in ethics and designed to engage and be effective across a diverse set of students. The seminar has been taught for more than ten years, and has informed a national initiative that is building a new AP course: csprinciples.org. After four years of a traditional lecture structure, the large nonmajor course recently adopted a collaborative, problem-oriented and lab-based approach and is concluding a successful pilot of this redesign. Both use current events to anchor an approach to educating a cyber-capable citizenry.

Owen Astrachan, *Professor of the Practice of Computer Science and Director of Undergraduate Studies*, and **R. Brook Osborne**, *National Directory of Outreach for Computer Science—both of Duke University*

CALIFORNIA BALLROOM A | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 33: Benefits of STEM-Themed Learning Communities for Underrepresented Students

Participants will examine three STEM-focused, living-learning programs; identify strategies for administering program assessment; and review outcomes for underrepresented students.

Residential learning communities at the University of Michigan are in their second year of a program assessment. The learning communities created a set of core learning outcomes, including academics, community engagement, and diversity, as well as a survey instrument that measured those outcomes. The survey was administered to students in the learning communities and a control group. In addition, student data, including academic performance and demographic information, were obtained for both learning community participants and the control group. In this session, presenters will share key findings from the two-year assessment, including significantly better outcomes on academic and learning measures for underrepresented students in the programs relative to the control. Participants will also learn of the program models, student demographics, and institutional context in which the programs operate.

Jennifer Maltby, *Associate Director, Michigan Research Community*, and **Chris Bass**, *Director, Michigan Research Community and Women in Science and Engineering Residence Program—both of University of Michigan*

CALIFORNIA BALLROOM B | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 34: Leadership Education as a Tool to Increase Retention and Graduation of Biological Sciences Students

Participants will be able to identify Tinto's four conditions to enhance student retention; recognize how aspects of leadership education programs can relate to student retention and graduation; and examine an innovative leadership program for underrepresented students in biological studies.

Institutions continue to search for ways to increase student retention and graduation rates, particularly among students in STEM fields. Vincent Tinto (2012), a Distinguished University Professor at Syracuse University whose research in higher education has focused on student retention, outlined four conditions that can enhance student retention— expectations, support, feedback, and involvement. This session will explore how various aspects of leadership education programs can be mapped to these four conditions and positively contribute to student retention. Findings from an innovative University of Minnesota leadership and service program for underrepresented students in the College of Biological Sciences, including first-generation college students, students of color, and students with a below average ACT score, indicate that engaging these students in a leadership education program is associated with higher retention and four-year graduation rates. Students also have a greater sense of self-awareness and are able to more effectively collaborate with others through program participation.

Nicole Letawsky Shultz, *Assistant Dean, College of Biological Sciences*, and **Meaghan Stein**, *Coordinator of Student Engagement, College of Biological Sciences—both of University of Minnesota—Twin Cities*

CALIFORNIA BALLROOM C | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 35: Developing a STEM Teaching Community: Organizing an Integrated Network of Education Research Groups

Participants will gain an understanding of key components required in forming STEM Education-Research Groups using a laboratory-group model and learn strategies for expanding this network to create a university-wide teaching community focused on improving learning and enhancing efforts to educate and retain a diverse STEM workforce.

Initiatives at Washington University are moving teaching from a solitary endeavor to a community effort. One primary initiative was the founding of the STEM Education Research Group (ERG), a multidisciplinary group of faculty and staff that meets weekly to discuss ongoing educational-research projects. The ERG uses a laboratory-group model that fosters collaboration among four groups of experts: faculty teaching in the disciplines, learning-sciences researchers,

cognitive-science researchers, and faculty developers. The diverse participant group and meeting format have fostered the development of numerous collaborative and evaluative research projects. To expand this teaching community, other ERGs focused on targeted STEM pedagogy themes are forming. A network structure to encourage cross-fertilization of ideas and collaborative projects will connect the groups. Leaders of this teaching community, encompassing multiple expert groups and perspectives, will present on the teaching-community philosophy and structure, preliminary participant outcomes, and detailed plans for expansion.

Regina F. Frey, Florence E. Moog Professor of STEM Education, Executive Director of the Teaching Center, Co-Director of the Center for Integrative Research in Cognition, Learning, and Education and **Kathryn G. Miller**, Professor and Chair of Biology—both of Washington University

5:30 – 7:00 p.m. Forum

SAN DIEGO BALLROOM, FOURTH FLOOR

Advancing Scientific Thinking and Integrative Reasoning Skills: The STIRS Project

Katherine Hunting, Professor of Environmental and Occupational Health—The George Washington University; and **Kevin Hovland**, Senior Director of Global Learning and Curricular Change—AAC&U

The STIRS project aims to make evidence-based reasoning a more explicit outcome of liberal education. STIRS rests on the belief that, to become engaged and productive citizens prepared to address the critical challenges of the twenty-first century, college graduates in all fields of study need to be able to use scientific reasoning to gather and evaluate evidence; understand how scientific and social science studies are designed and executed; recognize the implication of design choices; use statistical reasoning to evaluate data; use data to communicate effectively; and base decisions on analysis of evidence, logic, and ethics.

Forum participants will explore how they might create and use case studies to integrate evidence-based thinking across liberal education—focused by engagement with big questions, and anchored through active involvement with diverse communities and real-world challenges.

A cash bar and refreshments will contribute to the informal setting.

SATURDAY, NOVEMBER 2, 2013

7:00 – 8:00 a.m. Breakfast

SAN DIEGO BALLROOM, FOURTH FLOOR

8:00 – 9:00 a.m. Concurrent Sessions

SANTA FE ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 36: Evolution of Active Learning in Foundational Courses in Multiple Disciplines in a Large Public University

Participants will become familiar with just in time teaching, peer instruction, and the use of group work as approaches to increase student learning gains and student retention in the context of efforts to improve teaching and enhance student learning across the STEM disciplines.

This session will present preliminary results of an NSF-supported effort across multiple STEM disciplines to enhance learning in foundational STEM courses at a large public research university. A central theme, widely supported nationally, is that intentional active learning strategies engage students in ways that enhance their learning outcomes. The presenters have assembled faculty from across the STEM disciplines of biology, chemistry, geology, mathematics, and physics to combine just-in-time teaching, peer instruction techniques, and group activities across the foundational courses in each of these disciplines. They have also initiated learning communities that are crafted to serve the unique needs of first-generation STEM majors. Participants will learn of the results which include an increase in student performance accompanied by a distinctive decrease in the DWF rate (by up to 50 percent) in the biology, chemistry and physics courses. These results indicate that the learning communities are beneficial and show a modest increase in additional faculty participation.

Howard E. Jackson, Professor of Physics, and **Estel Sprague**, Professor of Chemistry—both of University of Cincinnati

Saturday, November 2

HARBOR ROOM, THIRD FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 37: Chicago Waterways: STEM to STEAM

Participants will leave the presentation with ideas on how to implement STEM and STEAM learning communities at their own colleges and data that links undergraduate research to student learning outcomes and success.

Learn how a community college in Illinois integrated the science and the arts to investigate, research, and report on the Chicago waterways. The research project involved seventeen students, seven faculty members, and the vice president of academic affairs. Students and faculty from the physical sciences, biology, English, art, and library science approached the project with different lenses. The group traveled to art museums, collected water samples on the Chicago River, surveyed residents, and learned from guest scientists and advocates from Friends of Chicago River as they became a true learning community. The project spanned two semesters and culminated in a poster session that was open to the community at large. Feedback from faculty and students as well as lessons learned will be shared.

Margie A. Martyn, Vice President of Academic Affairs, **Farah Movahedzadeh**, Faculty Member, and **Stephanie Burke**, Faculty Member—all of Harold Washington College, City Colleges of Chicago

CALIFORNIA BALLROOM C | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 38: Increasing Retention among STEM Students with a Focus on Underrepresented Minorities

Participants will come away with innovative ideas to build inclusivity in their campus communities and become more articulate in communicating their own visions for student success.

UMass Boston as a whole is very diverse, and it's College of Science and Mathematics (CSM) is a minority-majority college. In the past, retention and graduation rates for CSM were unacceptably low. Based on a careful analysis of student data, faculty and administrators identified challenges and opportunities for intervention and hypothesized that a cohort model (block enrollment in the necessary science and math classes) would get students started on the right track and help them stay on track. This led to the creation of the Student Success Center, the one-on-one advising and resource clearinghouse tailored to CSM students, and its centerpiece, the Freshman Success Community (FSC) program. Having grown to reach over half of the incoming freshmen, the FSC program is still expanding. Its increasing reach, along with the addition of related programs, has led directly to substantially greater retention rates, stronger academic performances, and higher overall student satisfaction. The presenters will share their model and facilitate discussion on how it might be adapted for participants' own campuses.

Andrew Grosovsky, Dean, College of Science and Mathematics, and **Marietta Schwartz**, Associate Dean, College of Science and Mathematics—both of University of Massachusetts Boston

CORONADO ROOM, THIRD FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 39: Implementing STEM Learning Communities that Integrate Tablet Technology

Participants will learn of a model for a technology-based learning community in a STEM first-year experience.

This session will share Miami Dade College's STEM first-year experience program, sponsored by the Department of Education, to augment the number of underrepresented individuals in the STEM fields. Capitalizing on iPad technology, this learning community was designed to use technology and peer-led team learning to support academic success. The presenter will share how students learned to work collaboratively and improve study and presentation skills. Session participants will demo tablet applications that were used in the learning community

Juan Miguel Morata, Professor of Biology—Miami Dade College

PLAZA ROOM, SECOND FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 40: Building Bridges in STEM: Expanding SUNY's Collaborations among Two- and Four-Year Institutions

Participants will learn successful strategies for seamless transfer of community college students to four-year institutions within a large multi-campus system.

Over the last thirteen years, Purchase College-SUNY has implemented the Baccalaureate and Beyond Community College Mentoring Program. This program aids underrepresented minority, financially disadvantaged, and first generation community college students in completing a bachelor's degree in STEM disciplines. The program received the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring Program in 2009. In 2010

SUNY took the first steps toward replicating this program within its sixty-four campus system. Since then, thirty different two-year and four-year institutions have been involved in the project, impacting 24,000 STEM students. Activities include summer remediation programs, undergraduate research programs, and active coordination between two-year and four-year SUNY faculty to increase articulation among programs. Presenters will briefly review the Purchase Program and discuss strategies that have been used to replicate the program and plans for the future.

Joseph A. Skrivanek, Professor and Chair of Chemistry—Purchase College, State University of New York; and **Carlos N. Medina**, Associate Provost and Associate Vice Chancellor of Diversity, Equity and Inclusion—State University of New York System Administration

CALIFORNIA BALLROOM A | THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

CS 41: Integrating Authentic Undergraduate Research throughout the Curriculum: A Course-Embedded Model

Participants will examine a curricular model that allows all STEM majors to be engaged in authentic research during all four years of matriculation.

Georgia Gwinnett College's STEM initiative includes a four-year undergraduate research program designed to enhance student engagement and learning in STEM disciplines and to support faculty innovation and leadership. It is well established that providing students with research experiences through all four years of their matriculation increases retention, improves student engagement, and sustains interest in STEM. The program identifies key courses in each year of the curriculum during which students are exposed to research skills and conduct authentic research experiences. The presenters will share how faculty have engaged in innovative ways of developing and/or redesigning courses to include course-embedded research experiences, designed individual faculty–student research projects, and developed Scholarship of Teaching and Learning projects.

Judy Awong-Taylor, Associate Dean, School of Science and Technology, **Thomas Mundie**, Dean, School of Science and Technology, **David Pursell**, Associate Professor of Chemistry, **Allison D'Costa**, Associate Professor of Biology, **Greta Giles**, Assistant Professor of Biology, and **Clay Runck**, Assistant Professor of Biology—all of Georgia Gwinnett College

9:15 – 10:15 a.m. Plenary

CALIFORNIA BALLROOM

Institutional Change: An Evolving Revolution That Begins One Voice at a Time

Tuajuanda C. Jordan, Dean of the College of Arts and Sciences, Professor of Chemistry, and Chief Diversity Officer—Lewis & Clark College

The science education landscape is gradually changing as educators redesign individual courses, pedagogies, curricula, and co-curricular activities to engage students in the process of doing science. But the full promise of these approaches remains unmet as the culture of most higher education institutions evolves more slowly than these individual advances. Drawing on experience as a student, faculty member, and administrator, Jordan will offer suggestions on how to empower those on the forefront of change to facilitate institution-wide transformation—beginning with one voice at a time.

10:15 – 10:30 a.m. Coffee Break

CALIFORNIA BALLROOM FOYER

10:30 – 11:45 a.m. Concurrent Sessions

HARBOR ROOM, THIRD FLOOR

CS 42: HEDs Up

This session will include three presentations followed by time for questions and discussion.

Moderator: **Judith Dilts**, Associate Dean, College of Science and Mathematics—James Madison University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Radical Revisioning of the Classroom and Laboratory

Dramatic changes can be made in the curriculum without sacrificing learning outcomes, and such changes may actually lead to a more important set of outcomes, including scientific literacy and familiarity with the scientific

Saturday, November 2

process. The California State University–Channel Islands biochemistry curriculum has been overhauled. Standard classroom and laboratory practices that focus on memorization and regurgitation have been replaced with activities that have students synthesize concepts, analyze scientific literature, and apply a scientific process. Analysis of student performance with standardized test questions and other assignments shows that our methods build the same core competencies as traditional approaches, while developing a parallel set of skills that may actually be more relevant to their future work as scientists. A qualitative analysis of student perceptions suggests that, while students are often more comfortable with familiar, traditional delivery methods that emphasize content-testing, they also feel the benefits of exposure to core concepts and methods.

Blake Gillespie, Associate Professor of Chemistry—California State University–Channel Islands

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Using Integrated Concentration in Science to Advance Tomorrow's Science Leaders

The world faces daunting problems such as developing clean energy and affordable medicines. However, higher education approaches typically do not engage students in such big challenges, nor teach students the attitudes, knowledge, and skills necessary to develop lasting solutions. To address this problem, the College of Natural Sciences at UMass Amherst has developed and launched the Integrative Concentration in Science (iCons) Program, which brings together students from several different majors in science, engineering, and public health, and sets them to work in multidisciplinary teams on current problems of global significance. In this talk the founding director of iCons will make a case for the need for this kind of integrative educational program; will describe the structure and pedagogy of iCons; and will share some early assessment data that augur well for the future.

Scott M. Auerbach, Professor of Chemistry, Director of iCons—University of Massachusetts Amherst

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

Establishing a Culture of Research through Research Courses

The Spelman College Biology Department has increased student engagement by establishing and maintaining a culture of research. This comprehensive departmental program uses research within courses to engage undergraduate biology students. Within a skills-based biology curriculum, faculty employ journal clubs, investigative laboratory exercises, project-based courses, and bioinformatics projects for in-class and out-of-class connections. Additionally, these pedagogical approaches provide additional tools of student assessment. Participants will learn how data from this program can serve as a framework to design analogous programs at their own institutions.

Mark E. Lee, Chair and Associate Professor of Biology, **Michael E. McGinnis**, Associate Professor of Biology, and **Aditi Pai**, Associate Professor of Biology—all of Spelman College

CALIFORNIA BALLROOM A | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 43: Putting Project-Based Learning at the Core for STEM Students: Curricular Design, Assessment, Institutional Change

Participants will map desired student learning outcomes and abilities to project-based learning (PBL) and other high-engagement activities and consider how PBL can be integrated into curricula and implemented on their campus.

STEM educators are increasingly interested in putting high-engagement activities such as project-based learning (PBL) at the core of STEM curricula. However, PBL requires changes in how both students and faculty spend their time, with implications for curricula, resources, faculty development, assessment, and institutional change. How can campuses make the case for the substantial curricular change needed to put PBL at the core of the curriculum, and what institutional changes and initiatives can ensure its success? With over forty years of experience delivering a project-based curriculum, Worcester Polytechnic Institute will share lessons learned and resources to help other institutions integrate project work into their curricula.

Richard Vaz, Dean of Interdisciplinary and Global Studies, and **Kristin Wobbe**, Associate Dean for Undergraduate Education—both of Worcester Polytechnic Institute

SANTA FE ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 44: Using Best Practices to Teach the Faculty: A Numeracy Infusion Course for Higher Education

Participants will learn best practices for teaching quantitative reasoning.

Quantitative reasoning (QR) skills are increasingly being recognized as essential components of a liberal arts education. Faculty at the City University of New York have developed a Numeracy Infusion Course for Higher Education (NICHE) to infuse QR instruction and assessment into undergraduate courses in a range of disciplines. NICHE is a predominantly online course that teaches faculty how to: (1) apply quantitative literacy/reasoning (QL/QR) within a disciplinary context; (2) articulate QR learning goals/objectives that reflect best practices for teaching quantitative literacy; (3) identify and implement best practices for teaching QR such as active learning, collaborative student learning, and writing with numerical information; (4) adapt and implement strategies for incorporating QR into course instruction; and (5) assess the effectiveness of QR initiatives and use the assessment results to further improve instruction. The facilitators will demonstrate some of the strategies used to train faculty how to effectively teach QR. **Esther Isabelle Wilder**, Professor of Sociology, and **Elin Waring**, Professor of Sociology—both of City University of New York-Herbert H. Lehman College

CORONADO ROOM, THIRD FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 45: Science Literacy in General Education: Assessing Its Meta-disciplinary Nature, Providing Metacognitive Solutions

Participants will assess the effectiveness of their own and their institution's efforts to impart science literacy, to develop students' ability to reason, and to teach meta-disciplinary reasoning.

A grand challenge for science in liberal and general education lies in helping the lay populace to recognize and use science's way of knowing to enable explanations of the physical world through testable information and evidence-based reasoning. Meta-disciplinary education requires thinkers to consider logic and evidence, but it adds a facet often missing in critical thinking by requiring the thinker to evaluate whether one has applied the most appropriate framework of reasoning. The results derived from assessing over 6,000 students with the Science Literacy Concept Inventory reveal what an effective inexpensive online assessment can teach us about the development of science literacy of students within our institutions, especially underrepresented groups. Presenters will address how meta-disciplinary reasoning skills can result from teaching metacognitive learning strategies, reflective introspection, and deliberate use of disciplinary content.

Edward Nuhfer, Director of Educational Effectiveness—Humboldt State University; and **Karl Wirth**, Professor of Geology—Macalester College

CALIFORNIA BALLROOM B | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 46: Developing and Utilizing Active Learning Exercises in the Science Classroom and Laboratory

Participants will discuss developing and using active learning strategies that can be used in class and lab.

This workshop will focus on the use of inquiry-based learning in classroom and laboratory components of science courses. Materials developed for use in undergraduate analytical chemistry courses will be used as a model for exercises suitable for use in other science courses. The facilitators will describe the paradigm shift of replacing traditional lectures with collaborative learning groups and traditional labs with experiences that involve an overarching research question related to a real-world context or local issue. This session is intended for science instructors at universities, community colleges, and high schools. It will provide participants with an opportunity to think of how they might begin to incorporate active learning exercises into the class and lab components of courses and assess those activities. Participants who have tried such methods will have the chance to share their experience with others in the session.

Thomas J. Wenzel, Charles A. Dana Professor of Chemistry—Bates College; and **Anna G. Cavinato**, Professor of Chemistry—Eastern Oregon University

SIERRA ROOM, SECOND FLOOR | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 47: Using Outcomes Data to Integrate Evolution and Other Threads across the Curriculum

Participants will see how they can successfully apply innovative pedagogy and outcomes-based assessment in introductory and advanced life science courses to achieving goals of learning and long-term retention of concepts related to evolution and other core concepts and competencies in biology.

Saturday, November 2

One way to define undergraduate scientific literacy is the ability to understand, apply, and integrate five core concepts throughout different biological disciplines. The purpose of this session is to present an innovative, multidisciplinary curriculum and the pedagogical approaches used to promote one of the core concepts: evolution. Moreover, this session will actively engage the audience by (1) outlining the innovative science curricula both at the lower- and upper-division levels that utilize evidence-based instruction to teach evolution; (2) presenting the various approaches to assess learning across the curriculum; and (3) modeling how this innovative pedagogy and the outcomes-based assessment may be applied to other campuses.

Marc Levis-Fitzgerald, Director, Survey Research and Curricular Assessment, Center for Educational Assessment, Office of Instructional Development, **Erin R. Sanders**, Adjunct Assistant Professor, Director of Initiatives in Life Science Laboratory Education, Co-Director of HHMI Science Education Grant, **Debra Pires**, Academic Administrator and Instructor, Life Science Core Curriculum, **Casey Shapiro**, Postdoctoral Scholar, Survey Research and Curricular Assessment, **Jordan Moberg Parker**, Lecturer, Department of Microbiology, Immunology and Molecular Genetics, and **Carlos Ayon**, Research Analyst, Survey Research and Curricular Assessment—all of University of California—Los Angeles

CALIFORNIA BALLROOM C | THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

CS 48: A Comprehensive Institutional Framework for Undergraduate STEM Education: Reports from a Keck/PKAL Project

Participants will learn about the framework process and have an opportunity to apply it to their own campus work in undergraduate STEM education.

The Keck/PKAL STEM Education Effectiveness Framework initiative aims to develop a comprehensive set of tools that will help campus leaders improve student learning and success in STEM with scalable and sustainable actions. Twelve colleges and universities in California are engaged in the project. They are working on a range of projects, from developing a culture of evidence-based teaching and using a data-driven approach to improving science in general education or in a STEM major. The framework process is grounded in the analysis of program and institutional data on student achievement, experiences, and progress (e.g., rates of transfer, retention, and completion) with a focus on minority student success. After reviewing examples from three participating project campuses, participants will develop a plan for creating a more comprehensive STEM education agenda for their institutions.

Susan Elrod, Dean of the College of Science and Mathematics—California State University-Fresno; **Sue Lowery**, Professor—University of San Diego; **Stephen Schellenberg**, Associate Dean in the Division of Undergraduate Studies—San Diego State University; and **Marco Molinaro**, Assistant Vice Provost for iAMSTEM—University of California—Davis

PLAZA ROOM, SECOND FLOOR | THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS

CS 49: A Galactic Alignment: The MESA STEM Alliance

Participants will gain insight to the pros and cons of contributing to, participating in, and leading a STEM Alliance across institutional segments and within their institution.

The Mathematics, Engineering, Science Achievement (MESA) program is California's only intersegmental STEM effort focused on decreasing the achievement gap and increasing the college graduation rate of educationally disadvantaged students. A key contributor to increasing the success of underrepresented students in the MESA network is the collaboration among all educational segments (middle school, high school, community college, and university), community organizations, and industry. As a result, student interest, knowledge, academic preparation, academic achievement, persistence, and retention in STEM studies have increased significantly. MESA has built a structured STEM education pathway based in hands-on learning, peer competitions, and collaborative learning. The San Diego MESA Alliance (SDMA) will be featured with members serving as facilitators and coaches. Participants will work on developing an action plan and share best practices for alliance building.

Julian Martinez, Director of Resource Development and Marketing, Mathematics, Engineering, Science Achievement (MESA)—University of California Office of the President

12:00 -12:15 p.m. Closing Remarks

CALIFORNIA BALLROOM B

Kelly Mack, Vice President of Undergraduate Science Education—AAC&U

Poster Sessions

SAN DIEGO BALLROOM, FOURTH FLOOR

Posters may be viewed throughout the day. Presenters will be available according to the schedule below.

Friday, November 1, 8:00 – 9:00 a.m. Poster Sessions

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 1: Interdisciplinary Problem Solving for Pre-Health Students: The Benefits of Sharing Teaching Resources

Solving interdisciplinary problems is a key skill for all students. It is one that pre-health students are increasingly asked to demonstrate. The new version of the Medical College Admissions Test® (MCAT®) to be administered in 2015 will ask students to solve interdisciplinary problems as part of the exam. The Pre-health Collection within MedEdPORTAL's iCollaborative was established in 2012 to support innovation in the curriculum. This new free and open online repository gives undergraduate faculty (1) the opportunity to submit original teaching resources used in their own courses; (2) refer resources they use that are authored by others; and (3) find resources to supplement their own courses.

Mark Pilgrim, Reviewer, Pre-health Collection—MedEdPORTAL's iCollaborative

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 3: Citizen Science: Using Inquiry-Based Learning to Advance Science Literacy

In recognition of the importance of science literacy as a key feature of an informed and engaged populous, a science literacy program was added to the core curriculum required of all first-year students at Bard College. During this intense three-week program, students engage in laboratory experimentation, computing projects, and problem-based learning classroom experiences in an effort to answer the question "How can we reduce the global burden of disease?" These experiences, in concert with use of case studies, historical scenarios, and current research and reports, challenge students to critically evaluate evidence, analyze and interpret data, and understand the strengths and limitations of commonly used tools. This poster will share the program design and student response and outcomes from the first three years.

Amy F. Savage, Director, Citizen Science Program—Bard College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 5: STEM Outreach as Integrative Learning: Enhancing K-12 STEM Pathways for Underserved Schools

In STEM fields, educational outreach activities abound, whether required by funding agencies or pursued by motivated students and faculty seeking to contribute to their communities, improve scientific literacy, and inspire future scientists. Caltech has launched a new Center for Teaching, Learning, and Outreach, to develop programs that enhance university students' integrative learning and STEM pathways for K-12 students from underserved schools. This poster will include outcomes for both university and K-12 students, and show the potential for enhanced integration of STEM educational outreach into undergraduate curricula for deep mutual benefits.

Cassandra Volpe Horii, Director, Caltech Center for Teaching, Learning, and Outreach, and **Mitch Aiken**, Associate Director for Educational Outreach, Caltech Center for Teaching, Learning, and Outreach—both of California Institute of Technology

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 7: Reinventing a General Education Chemistry Course for an Environmentally-Themed Learning Community

Faculty at two schools redesigned traditional general education chemistry courses so their diverse student populations will be more engaged and gain an appreciation of the relevance of chemistry to their lives and their communities. Learning outcomes now emphasize scientific and quantitative reasoning skills rather than content knowledge and include a variety of high-impact practices. The design process, examples of implementation, and assessment data will be presented.

Alison McCurdy, Professor of Chemistry—California State University—Los Angeles; and **Veronica Jaramillo**, Professor of Chemistry—Pasadena City College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 9: Interdisciplinary Toolkits to Engage and Train All Students in STEM

Future generations of scientists, K-12 teachers, and our citizenry require an interdisciplinary understanding and approach to STEM topics in order to address today's challenging scientific questions. Unfortunately, from kindergarten to the undergraduate level, the STEM disciplines are siloed into distinct and disparate disciplines leaving students to identify and understand connections on their own. The presenters are developing a series of interdisciplinary toolkits to help change how STEM disciplines are taught at all levels. These toolkits provide an engaging theme through which biology, chemistry,

geology, mathematics, and physics are introduced. Student-led, interactive and inquiry-based activities are then utilized to introduce and help students understand key concepts. This poster will demonstrate this introductory level model.

Barbara May, Associate Professor of Biology—College of St. Benedict/St. John's University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 11: Impact on Attitude in Learning in Biology through Virtual Laboratory

Virtual lab was used in Biological Sciences Laboratory for first-year non-biology majors at Dillard University to allow students to simulate from the safety of their personal computer, experiments that may require expensive or dangerous materials. Pre- and post-assessment findings revealed that non-science majors had a more negative attitude towards biology in the beginning than at the end of the semester. By the end of the semester, the margin had decreased significantly. This poster will explore aspects of virtual labs and how they affect attitudes towards biology for nonmajors.

Ruby Broadway, Associate Professor of Biology—Dillard University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 13: Enhancing the STEM Experience by Engaging Freshman in Undergraduate Research

Involving students in collaborative and original research has proven to be a powerful educational tool to attract, retain, and engage students in STEM. In 2005, the Marine Science program at Eckerd College incorporated the Freshman Research Program (FRP) into its curriculum to offer opportunities for freshmen to work closely with a faculty mentor on a research project during the academic year. Since the program's inception, it has created a social infrastructure in which former FRP students become peer mentors; promoted an institutional research culture that has spread to other STEM and non-STEM majors; and enhanced graduates' success in securing professional opportunities. This poster will address how to incorporate a FRP as part of teaching, mentoring, and research responsibilities; the importance of involving different campus constituencies in establishing a FRP; and how the FRP experience can impact student success in STEM.

Nancy Frances Smith, Chair of the Natural Sciences Collegium and Associate Professor of Marine Science and Biology, and **William Szelistowski**, Associate Professor of Marine Science and Biology—both of Eckerd College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 15: Exploring Integrative STEM Learning via Dual Enrollment: JMU's Geospatial Semester

The continued interest in dual enrollment offers a unique opportunity for colleges and universities to engage with secondary schools to offer integrative learning experiences prior to a student ever setting foot on campus, thus setting expectations for the STEM learning to come. This poster will describe JMU's Geospatial Semester, a unique mentored dual-enrollment program where high school students learn about cutting-edge geospatial technologies and apply them to local problems of interest. Participating students build spatial thinking skills, a critical element for STEM success.

Bob Kolvoord, Interim Dean, College of Integrated Science and Engineering—James Madison University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 17: Mixing Students and Unmixing Phases: A Multidisciplinary Approach to Learning about Phase Equilibria

For many chemistry, engineering, geology, and physics students, the topic of phase equilibria is challenging and presents a hurdle to deeper levels of understanding. However, once students master this threshold concept, it not only transforms their understanding of the fundamental nature of matter, but also provides a framework for integrating learning across disciplinary boundaries. This poster will share a multidisciplinary, problem-based approach to teach phase equilibria to students in chemistry and geology. Although the system is relatively simple, it has many interesting features and students encounter a number of challenges that lead them to ask their own questions and find their own solutions.

Karl R. Wirth, Associate Professor of Geology, and **Tom Varberg**, Professor of Chemistry—both of Macalester College

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 19: Enhancing STEM Courses with Multimedia Technology

Teaching STEM courses through distance learning can be challenging for both the educator and the student. Innovative use of multimedia in the form of audio, video, and other interactive tools can supplement traditional teaching and learning. This poster will describe ways in which multimedia lessons were utilized to teach statistics and kinesiology in both online and face-to-face courses. Examples will focus on the hardware, software, and web-based applications used to create lessons. Implementation successes and challenges along with student experiences will be discussed.

Gina Blunt Gonzalez, Associate Professor of Exercise Science—Morehead State University

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 21: Highlighting the Importance of Graduate Student Professional Development Programs in STEM Education

This poster will illustrate the importance of professional development and training for graduate student teaching assistants (GTAs) specifically in the teaching of calculus and in STEM fields in general. GTAs contribute to calculus instruction in two ways: as the primary teacher and as recitation leaders. Findings from a large, nationwide study show that GTAs are teaching a large percentage of Calculus I students and receiving widely varied preparation for this teaching.

Jessica Ellis, Graduate Student—San Diego State University

Friday, November 1, 10:45 a.m. – 12:00 p.m. Poster Sessions

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 2: Sustainability Improves Student Learning

The potential for transformative curricular action by STEM disciplinary societies is the focus of a three-year grant from the US Department of Education Fund for the Improvement of Postsecondary Education (FIPSE) called “Sustainability Improves Student Learning” or SISL. This grant, funded through the end of 2013, has engaged eleven STEM disciplinary societies to identify shared goals, existing resources, common needs, and new opportunities that relate to the teaching and learning of real-world issues in undergraduate courses. This poster will report on the outcomes of a convocation held in September 2013 to increase the number of professional societies involved in SISL and to broaden the efforts beyond STEM and share resources to engage students in solving our sustainability challenges while improving student learning.

Catherine Fry, Project Manager—Project Kaleidoscope/AAC&U

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 4: Utilizing Technology to Ensure Curriculum Consistency in a Traditional versus Hybrid Chemistry Course

To meet the needs of a diverse student population, St. Catherine University offers both a traditional day program and equivalent learning opportunities in an evening, weekend, and online program. This poster will share the development of a hybrid lab science course, Chemistry of Life, from its traditional face-to-face equivalent. The Chemistry of Life course is a general education lab science course with a population of students diverse in age, class, and racial/ethnic background. The poster will include strategies used to adapt a face-to-face lab science course to a hybrid model, specifically addressing these four areas: use of online mini lectures, class discussions, free and affordable technology, and the laboratory experience. Some preliminary findings comparing achievement of assessment goals and student feedback will be included.

Gina Mancini-Samuels, Professor of Chemistry, and Annalisa Jordan, Professor of Chemistry—both of St. Catherine University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 6: Co-Teaching STEM in Higher Education: Planning, Instructing, and Assessing

This poster will highlight key components to successful co-teaching. Participants will learn how co-teaching goes beyond team-teaching, planning dos and don'ts, instructional strategies, and tips regarding effective assessments. The poster will share the example of St. Catherine University faculty members from education and STEM departments who co-teach elementary education non-science majors through a model that relates science and engineering to real world problems.

Natasha L. Yates, Assistant Professor—St. Catherine University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 8: Improving Student Success in Calculus: A Comparison of Four College Calculus Classes

Calculus is a linchpin course in the educational careers of STEM students. Unfortunately, many students are driven out of STEM major tracks by dull, uninspiring, unimaginative calculus classes in which a quarter of students will not achieve passing grades (Seymour, 2006; Bressoud, 2011; PCAST, 2006). Using a mixed-methods approach combining quantitative achievement and survey data with qualitative interview and classroom observation data, this poster will report on the effectiveness of four pedagogical approaches to Calculus I: a traditional lecture, a student-centered interactive lecture, a technology-intensive curriculum, and an inverted model.

Spencer Bagley, Doctoral student—San Diego State University

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 10: Infusing Critical Thinking, Community Partners, and Research into the STEM First-Year Experience

This poster will describe efforts at Sonoma State University to offer first-year STEM students inquiry-based learning experiences that promote and enhance scientific reasoning and improve retention. The poster will focus on two efforts.

The first provides an interdisciplinary STEM course that uses the theme of environmental sustainability in the local watershed coupled with community partnerships and research exploration to attract undeclared students to STEM. The second effort creates a learning community for first-year chemistry and biochemistry majors that integrates core chemistry content with critical thinking skills using extended case studies in the course “Thinking like a Scientist.”

Lynn Stauffer, *Dean of the School of Science, and Technology*, and **Carmen Works**, *Professor of Chemistry—both of Sonoma State University*

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 12: Restoring a Community Forest on a Sandhill: Engaging STEM and Non-STEM Majors in Environmental Ed
Stetson University’s program on “Teaching Landscape: The Volusia Sandhill Ecosystem” educates about Florida’s historic longleaf pine ecosystem. This poster will share how this grant-funded urban reforestation effort to transform a sandy slope adjacent to the university’s earth science museum has engaged STEM and non-STEM majors as well as community volunteers in a highly visible project. The poster presentation will encourage frank discussion of limits and opportunities of this project to turn a disturbed, urban landscape into an outdoor STEM classroom, a community partnership, and an environmentally responsible site.

Karen L. Cole, *Director, Gillespie Museum*, and **Cindy Bennington**, *Professor of Biology—both of Stetson University*

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 14: Challenge-Based Learning to Engage STEM Instructors and Students

Challenge-Based Learning (CBL) starts with a big idea or grand challenge that engages students and requires their active participation in order to develop a solution. Carefully designed, CBL can provide a means to teach disciplinary content in an authentic, socially relevant context while helping students to realize the significance of STEM careers. This poster will share preliminary results of the presenters’ work with middle school and high school teachers using CBL and engineering design-based learning as a pedagogical approach.

Howard E. Jackson, *Professor of Physics*, and **Anant R. Kukreti**, *Director of Engineering Outreach and Professor in the School of Energy, Environmental, Biological and Medical Engineering—both of University of Cincinnati*

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 16: Using Clickers in the STEM Classroom to Promote Student Engagement and Learning

The use of clickers (classroom response systems) in college classes has been increasing. Clickers are an easy way to measure student understanding of material in real time, and depending on how the clicker is used, cooperative learning is encouraged, and a deeper understanding of STEM material can occur. This poster will demonstrate one approach to using clickers to engage students and to foster critical thinking in an upper-level biology class. It will feature question design and class activities which have proved useful, along with analysis of student clicker use and knowledge. The use of clickers reflects LEAP Essential Learning Outcomes by focusing on critical and creative thinking, teamwork, and problem solving.

Deborah A. O’Dell, *Associate Professor of Biology—University of Mary Washington*

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 18: Environmental Geoscience Bridge Workshops

The Massachusetts Board of Higher Education established the Vision Project to address issues of college completion, workforce alignment and disparities in all areas of educational progress. UMass Lowell’s Bridge workshops specifically address college completion and academic success within the STEM fields. Many students who start as STEM majors change their major—a decision that may be prompted, in part, by a significant lack of basic skills. This poster will share details of workshops that advance student learning and retention and promote diversity in STEM fields.

Lori Weeden, *Lecturer—University of Massachusetts Lowell*

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 20: Infusing the Research Experience into the Heart of a Biology Majors Curriculum

In Fall 2012, the Biology Department of the University of San Diego launched a new curriculum for majors centered on an authentic research experience. Prior to implementation of the new major, assessment of information literacy, analytical, synthetic, and communication skills during senior seminars demonstrated that students who participated in research achieved higher levels of proficiency. The goal of the new major is to extend this deeper learning to all biology majors, primarily through participation in research methods or projects courses in which small groups of students engage in semester-long sets of experiments, while retaining the option for independent research opportunities with individual

faculty members. Standard learning outcomes for these various options will be addressed through explicit training in methodology, hypothesis testing, and use of basic statistical analysis. Key preparatory elements will be identified.
Sue Lowery, Professor of Biology, and **Geoffrey Morse**, Associate Professor of Biology—both of University of San Diego

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 22: Comparing Industry and Academic Partnerships in STEM and Business: Student, Faculty, Staff Perceptions

According to recent reports, industry and education leaders increasingly underscore the need that all students, especially minorities, have equitable access to high-impact educational practices that prepare them for work, citizenship, global interdependence, and a fulfilling life. To address these concerns, researchers began exploring efforts to transform undergraduate STEM experiences and strengthen the partnership between industry and academia. Researchers will share data from a quantitative study of first-time students entering in 2003, 2004, and 2005 at four institutions in three STEM majors (computer science, engineering, and math) with comparison data from business majors at the same institutions. Data details the students' migration patterns throughout their academic career. Additionally, researchers will present qualitative data from their recent follow-up study of sixty-four focus groups of students, faculty, and administrators from the same institutions in the same STEM majors with comparison focus groups of business majors.

Erin Denise Knepler, P-20 Program Director, and **Tiffani Williams**, P-20 Specialist—both of University System of Maryland

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 24: Shifting Student Perceptions toward Expert-Like Thinking in Introductory Biology

After completing introductory biology, student attitudes about biology often shift toward more novice-like perceptions rather than toward expert-like thinking. To address this problem, University of Washington Bothell created a hybrid introductory biology class that utilized four learning environments: face-to-face classroom instruction, small breakout sessions lead by peer facilitators, a classroom blog, and laboratory exercises. This poster will share details and assessments of the course.

Bryan D. White, Assistant Professor of Biology—University of Washington Bothell

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 26: Computing in Context: Inquiry-Based Learning for the Knowledge Society

As computer science moves into its sixth decade as a formal field of study, a great deal of attention is focused on the breadth of relationships between computing and other disciplines. Descriptors of this relationship include computing in context, computing + X, computational X, interdisciplinary computing, and distributed expertise. Whatever the favorite descriptor, the goals for exploring the relationship between computing and another discipline remain the same: students will need to understand how the power of computing informs and shapes ideas throughout society. They will need to learn appropriate concepts in computing and see these applied to other areas of study. The poster will show current areas of exploration and examples of inquiry-based investigations including computing and music and computational linguistics.

Robert E. Beck, Professor of Computing Sciences—Villanova University

Friday, November 1, 1:45 – 2:45 p.m.

Poster Sessions

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Poster 23: Quantitative Literacy in the Context of College Algebra.

The poster will share several examples from the speaker's forthcoming college algebra text entitled *Algebra: Modeling Our World*. The course and the text seek to incorporate quantitative literacy through the use of problem solving and modeling situations involving real-world data. Examples related to social issues including energy, the environment, hunger, health care, and politics are included and can be used as stand-alone activities in college algebra, quantitative literacy courses, and possibly statistics.

Michael Catalano, Professor of Mathematics and Chair of the Department—Dakota Wesleyan University

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THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

Poster 25: Development of the Quantitative Reasoning Items on the National Survey of Student Engagement

This poster will detail the development of the quantitative reasoning (QR) items on the National Survey of Student Engagement (NSSE). In 2013, a major revision of the NSSE survey was launched that included items asking students about their use of QR activities in college. This poster will describe the three-year development process including item development, pilot testing, psychometric properties of the items, and results from cognitive interviews and focus groups

with students. Descriptive findings for students' use of QR activities by disciplinary field will also be presented along with suggestions for assessment opportunities.

Louis M. Rocconi, Assistant Research Scientist, and **Amber D. Lambert**, Assistant Research Scientist—both of Indiana University

Sponsored by the National Numeracy Network

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 27: Peer Mentoring as an Effective Strategy to Support Underrepresented Student Persistence in STEM

As a member of the NSF Wisconsin Louis Stokes Alliance for Minority Participation consortium, Alverno College receives funds to support a peer mentoring program encouraging minority student retention in STEM. Of 140 STEM majors, 50 identify as belonging to an underrepresented minority group. This poster will describe the organization of a peer mentoring program, including the recruitment and leadership development of peer mentors, mentor/mentee interactions, engagement with all STEM students, and collaborative faculty/administrative support. Preliminary data of these efforts will be presented. While the peer mentoring is directed at minority STEM students, this program is part of a larger initiative in science and math focused on engaging all STEM students beyond the classroom and creating a learning community of STEM majors.

Angela Frey, Associate Dean, Natural Sciences, Mathematics and Technology—Alverno College

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 29: The Engineering Success Alliance: From Surviving to Thriving

The Engineering Success Alliance (ESA) program provides students from under-resourced high schools with the skills they need to be successful in a nationally recognized engineering program at Bucknell University. Students participate in a week-long pre-orientation program immediately prior to first-year orientation and in ongoing programming during the academic year that is focused on academic self-efficacy, community and belonging, and finding balance. This poster will share how the program was built out of Uri Treisman's work to promote academic success and share effective features of the program and evaluation data.

Karen T. Marosi, Associate Dean of Engineering—Bucknell University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 31: Building Community in STEM at Carleton College: Cohort Program Components and Evaluation

Carleton College has developed two cohort programs in STEM, Focusing on Cultivating Scientists (FOCUS) and the Carleton Summer Science Fellows (CSSF), each of which is designed to enhance the academic success of students from groups traditionally underrepresented in STEM fields. Both FOCUS and CSSF were created with the assumption that students will continue to seek scholarship and careers in science and math fields if they have academic success, confidence in their ability to pursue these fields, and comfort within science and math communities (among students, staff, and faculty). This poster will describe program components within the liberal-arts context, evaluate student experiences, and highlight components of the program that are adaptable to other campuses.

Deborah S. Gross, Professor of Chemistry, **Joseph W. Chihade**, Associate Professor of Chemistry, and **Cathryn Manduca**, Director of Science Education Resource Center—all of Carleton College

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 33: Using Technology to Make STEM Concepts Relevant to Personal Experience

Underrepresented students entering STEM disciplines are often looking for financially rewarding careers, but many are discouraged because they find the concepts too abstract and irrelevant to their lives. By customizing technology to teach STEM courses in the context of societal problems to which students can relate, educators can inspire students to view STEM careers as a problem-solving mechanism for improving their own communities and thereby increase retention. This poster will share online programs used to enliven biological concepts as well as examples of students' project-based e-portfolios and discussion forums.

Maryam Bamshad, Assistant Professor of Biology—City University of New York Herbert H. Lehman College

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 35: From Science Lab to Browser Tab: The First Year of the NANSLO Project

This poster will present the results from the first year of the Next Generation Learning Challenges (NGLC)-funded North American Network of Science Labs Online (NANSLO) project, highlighting the use of the Remote Web-based Science Lab (RWSL). The poster will describe the RWSL innovation, as well as the results from its use in online community college science courses. Student and instructor responses to the RWSL, and the results of a comparison between lab reports

(resulting from remote labs, kit labs, and traditional labs) will also be presented. The RWSL will be demonstrated. **Daniel Branan**, Lab Director, North American Network of Science Labs Online, and **Paul J. Bennett**, Lab Technology Manager, North American Network of Science Labs Online—both of Colorado Community College System

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 37: Retaining Student Interest in STEM Through Graduation: Faculty and Institutional Strategies

Oxford College is a specialized division of Emory University offering a liberal arts-intensive curriculum for the first two years of the baccalaureate degree. Students entering Oxford College who express initial interest in STEM majors continue on to graduate in STEM disciplines at higher rates than students nationwide. In particular, Latino and African American student persistence rates in STEM fields are noticeably elevated when compared to national averages. This poster will document these data and provide examples of pedagogical approaches and institutional strategies that support effective science education and promote student persistence in STEM disciplines. Underrepresented minority student success in specific STEM disciplines, including nursing, is measured by retention and graduation rates. Possible links between pedagogical approaches, institutional support, and student success/persistence in STEM will be explored.

Satu Riutta, Director of Institutional Research, and **Ann Massey**, Clinical Assistant Professor, Nell Hodgson Woodruff School of Nursing—both of Emory University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 39: Recruiting High School Girls into STEM Disciplines

Broadening Access to Science Education (BASE) camp is a two-week residential science program for high school girls from our neighboring city of Bridgeport. Currently funded by the National Institute on Minority Health and Health Disparities, the camp is a collaborative effort between Fairfield University faculty, undergraduate science majors, nonprofit community organizations, and high school science teachers designed to encourage traditionally underrepresented groups to pursue STEM-based careers. Annually, twenty-four applicants are selected to participate at no cost. The camp includes (1) a research immersion experience, with hands-on participation in faculty-led projects; (2) active discussions about careers in science and health; and (3) college admissions counseling for students and their caregivers. This poster will review the program and discuss the range of inquiry-based research projects and mentoring activities used to elicit interest in science. In addition, presenters will share data examining the impact of BASE camp on student interest in STEM careers and the pursuit of science in college.

Shannon M. Harding, Associate Professor of Psychology, and **Shelley A. Phelan**, Professor of Biology—both of Fairfield University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 41: Aligning for Success: The Central Indiana STEM Talent Expansion Program at IUPUI

The Central Indiana STEM Talent Expansion Program at IUPUI, funded by the NSF, is creating a central Indiana pipeline and a university culture change to increase the number of IUPUI students obtaining STEM degrees. This project addresses initiatives needed for transforming undergraduate STEM education by propagating, expanding, and creating new research-based educational innovations in undergraduate STEM education at IUPUI. Specific efforts include emphasizing student success, career services, student-centered pedagogies, and articulations with our community college partner. This poster will highlight background information, describe project emphasis areas, identify current progress toward goals, and outline the future trajectory.

Stephen P. Hundley, Chair and Associate Professor, Department of Technology Leadership and Communication—Indiana University-Purdue University Indianapolis

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 43: The Hegemony of English in STEM Higher Education-Impacts and Remedies

This poster shares a study on the hegemony of English, its definition, and its implications on Asian and Latina/o STEM community college students whose heritage languages are not English. This study challenges and resists the hegemony of English as a means of increasing Asian and Latina/o STEM student recruitment, support, and retention. Utilizing individual and group interviews, as well as a unique exercise experience, this qualitative study illuminates the effects of the hegemony of English on its sample population of STEM students and also offers tested student support programs and services that are replicable at other institutions.

Erik C.D. Belmal, Graduate Student, School of Education—Loyola Marymount University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 45: A Summer Bridge Program Focused on Community, Leadership, and Academics

Underrepresented minority students leave STEM disciplines at higher rates than majority students. As an intervention, pre-college summer bridge programs have been successful. However, evaluation of existing programs focuses on retention at graduation and lacks information on student experiences while in college. Furthermore, traditional summer bridge programs employ a narrow definition of diversity that emphasizes ethnic backgrounds and academic under-preparedness. This poster reports on a novel summer bridge program for incoming biology students from underrepresented groups that aims to address some of the gaps in literature described above.

Luke C. Flores, Program Manager—Northwestern University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 47: Supporting First-Generation College Student Success in Introductory Chemistry

Like many other universities, Santa Clara University (SCU) has seen many first-generation college (FGC) students leaving STEM fields early in their college careers due to the challenges of their introductory chemistry courses. A major factor contributing to these challenges is the students' lack of experience utilizing quantitative skills in a chemistry context. As a result, the LEAD Scholar Program at SCU, which supports FGC students, worked collaboratively with a senior lecturer in Chemistry to design two pilot companion courses that focus on developing students' quantitative skills in order to increase their success in and persistence through general freshman chemistry courses. Assessments of this pilot study indicate both the effectiveness of this course and interventions with the most impact.

Leilani M. Miller, Director of LEAD Scholars Program, University Honors Program, and Student Fellowships Program, Steven Fedder, Senior Lecturer, Chemistry Department, and Erin Kimura-Walsh, Assistant Director, LEAD Scholars Program—all of Santa Clara University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 49: Adult Nontraditional Female Students in STEM Majors: What Can We Do to Support Them?

The continued underrepresentation of women pursuing STEM majors and careers is detrimental to women's lives, their families, and society as a whole. An increasing number of women are attending college, yet there is very little research addressing the nontraditional female learner returning to the university to pursue a STEM major. This case study explored issues around persistence among this population through a lens of Social Cognitive Career Theory. The study utilized interviews, artwork, journals, and observation to gain a deep understanding of five women's experiences. Results identified critical factors in goal attainment that influenced their ability to find value, and discover harmony supporting their persistence in a STEM major. Implications for practice and future research will be presented.

Patrice Prusko Torcivia, Visiting Assistant Professor—State University of New York Empire State College

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 51: Supporting Underrepresented Student Achievement in Science by Partnering with K-12 Teachers and Schools

The underrepresentation of certain minority groups in STEM fields in college is largely due to preparation gaps in their pre-college education. There is evidence that these gaps can be ameliorated by interactive, inquiry-based instruction. In an effort to strengthen the pipeline of minority students into science disciplines, a partnership of institutions has implemented faculty-led, professional-development programs in inquiry instruction for K-12 science teachers, following two different approaches. One program models hands-on inquiry instruction oriented around different science disciplines. The other focuses on helping teachers listen for and respond to their students' conceptual ideas and reasoning. Both involve the leadership of master teachers. The presenter has found that the students of these teachers (in both programs) have higher achievement in science and sustain higher levels of interest in science than comparison groups. This poster will show one example of how higher education faculty can help prepare their future students before they even get to college.

David May, Project Director, P-20 Partnerships and STEM Initiatives—The University System of Maryland Office

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 53: SPECTRA Summer Scholars: A Pre-College Bridge Program for At-Risk Students

Students planning a STEM major but with poor preparation in math and science can quickly lose their motivation when encountering difficult introductory courses. Students from underrepresented backgrounds may be especially unlikely to feel comfortable seeking out the help they need. Truman State's Scientists Prepared, Enriched, and Challenged Through Research-based Activities (SPECTRA) Summer Scholars program helps rising freshman STEM majors overcome shortfalls in their mathematical and scientific preparation while also helping them learn the study skills needed to thrive in future STEM

classes. This poster will share details of the program and evaluation data.

Barbara K. Kramer, Associate Professor of Chemistry—Truman State University

Friday, November 1, 4:15 – 5:15 p.m.

Poster Sessions

THEME 1: ADVANCING INTEGRATIVE AND PROBLEM-CENTERED STEM LEARNING

POSTER 28: How Much Does that Hot Shower Cost?

This poster will share a problem-centered sustainability activity on water and energy usage, used in a quantitative reasoning course. The problem was developed during participation in a workshop on sustainability and quantitative reasoning across the curriculum and is both relevant and accessible to today's college students.

Margot Black, Math Skills Center Director—Lewis & Clark College

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THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 30: Quantitative Literacy and Reasoning Assessment NSF TUES Project Results

This poster will present results from a two-year pilot project, Quantitative Literacy and Reasoning Assessment (QLRA), in the NSF Transforming Undergraduate Education in STEM program. The QLRA project created a nonproprietary QLR assessment instrument for use at schools across the country. To date over twenty schools and 3,000 students have participated in piloting the test, providing baseline QR scores for students at two-year schools and four-year schools (both selective and non-selective). The results from the first year led to an iterative redesign process of the test. An online test administration portal was developed by the Science Education Resource Center and is ready for use by any institutions interested in administering this test.

Eric Gaze, Director of the Quantitative Reasoning Program—Bowdoin College

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THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 32: Quantitative and Mathematics Support Centers: Update from the National Science Foundation Workshop

Quantitative and Mathematics Support Centers (QMaSCs) exist in some form at many colleges and universities. These centers are pivotal to student retention in the STEM pipeline and in developing a future work force with the required tools for tackling STEM problems. QMaSCs often serve students outside of STEM to broaden quantitative competency across the curriculum. Leadership and administration of these centers takes a variety of forms with some led by tenure-track faculty, others by part-time or full-time staff. While QMaSCs perform a critical academic support function, little is known about them at a national level. Likewise, no infrastructure exists for the discussion of center issues or the dissemination of resources to guide new or experienced directors of QMaSCs. This poster will present an update on a handbook for QMaSC directors, one of the primary outcomes of a recent National Science Foundation workshop.

Grace L. Coulombe, Director, Mathematics and Statistics Workshop—Bates College; and **McKayla Nuffer**, Assistant Director, Martha E. '62 and Gregg E. Peterson Quantitative Resource Center—St. Lawrence University

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THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 34: Developing Students' Scientific Reasoning and Practice Skills

Recent research has identified characteristics that promote student success in science, including the use of inquiry-based science instruction, participation in an undergraduate research experience, and the use of collaborative quizzes. As a component of an NSF STEM Talent Expansion Program grant, the presenters have developed a new course based on these and other research findings. The new course, Scientific Reasoning and Practices, was offered during a summer bridge program for incoming first-year students from underrepresented groups and uses a lecture/activity format to prepare students for college-level science coursework. The poster will introduce the course, share activities, and report assessment results, including the Lawson Survey of Scientific Reasoning. The course meets LEAP Essential Learning Outcomes by focusing on (1) written and oral communication; (2) quantitative literacy; and (3) teamwork and problem solving. It also emphasizes the high impact practices of collaborative assignments and projects and undergraduate research.

Debra L. Hydorn, Professor of Mathematics, and **Kathryn Loesser-Casey**, Professor of Biology—both of University of Mary Washington

LEAP Featured Session

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 36: The Michigan Biology Academy Scholars Program

The mission of the Michigan Biology Academy Scholars Program (M-Bio) at the University of Michigan is to strengthen and diversify the cohort of students who receive their baccalaureate degrees in the biological sciences, with the ultimate goal of increasing the number and diversity of students who are well-prepared to seek career opportunities or to pursue graduate or professional training. The M-Bio Program is now part of a larger campus initiative, the M-STEM Academies, which joins similar efforts in engineering and for which expanded efforts in physics, biophysics, chemistry, astronomy, earth and environmental sciences, and mathematics are underway. The poster will share how these programs provide an integrated, holistic co-curricular support system for students with high ability and potential in science.

Claire Sandler, Director of Science Learning Center—University of Michigan

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 38: Positive Influences of a Small Cohort, with Problem Based Learning, for Pre-Health Science Students

In introductory biology, pre-health students had poor pass rates and concept retention; additionally, their pass rates in later courses and acceptance into the major were low. A pilot project, concentrating on one cohort of average students, provided extra support, including supplemental instruction (SI), recitation, and problem based learning (PBL). This poster will share observations suggesting that a small cohort, following a known course sequence and provided with additional support, has a greater chance of passing basic biology courses.

Cheraton F. Love, Director of STEM Initiatives, **Daniel B. Williams**, Associate Professor of Molecular Biology, and **David S. Kump**, Associate Professor of Physiology—all of Winston-Salem State University

THEME 2: SUPPORTING UNDERREPRESENTED STUDENT ACHIEVEMENT AND REVERSING THE TALENT LOSS IN STEM FIELDS

POSTER 40: Using Writing in the Sciences to Maintain Quality STEM Participation

Studies demonstrate that writing, reading, and hands-on experiences lead to greater critical thinking, thoughtful analyses, and better concept learning. Winston-Salem State University (WSSU), has designed a model which includes student development, faculty development, and curriculum modifications to improve the writing skills of STEM students. Through this model, four goals were designed. STEM students should demonstrate competence in written communication, using language, conventions, organization, supporting evidence, and content appropriate to the purpose and audience. They also should be able to use the process and criteria for judging writing and demonstrate confidence in their ability to write effectively and provide feedback to peers. Workshops for faculty and students are held continuously to ensure that WSSU STEM graduates are able to write competently. Faculty-student teams also develop research proposals together while awarding course credit to the student. This model, and modifications based upon our data, will be discussed.

Jill Keith Harp, Professor of Biochemistry and Chair, Department of Life Sciences, and **Mesia Steed**, Assistant Professor of Cell and Molecular Biology—both of Winston-Salem State University

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 42: Models of STEM Faculty Professional Development Workshops: National versus Local

It is widely recognized that beginning faculty members, particularly in STEM fields, need professional development in teaching, learning, and leadership. This poster will compare three models for that professional development: (1) national workshops run by disciplinary societies; (2) multidisciplinary national and regional workshops organized by PKAL; and (3) locally run workshops organized by college and university teaching and learning centers.

Beth A. Cunningham, Executive Officer—American Association of Physics Teachers

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 44: Getting Students to Think: Instruction Design to Promote Knowledge and Skill Transfer

Using knowledge in a new context (i.e., transfer) is at the heart of higher-order thinking such as applying, analyzing, evaluating, and creating. The National Research Council publication [Education for Life and Work](#), reviews evidence that learning environments can be designed to help students use knowledge. Many features of such environments (e.g. practice with feedback) have been shown to especially help underprepared students. Six features of instruction that promote transfer will be shared.

Amy Mulnix, Professor of Biology and Associate Academic Dean—Earlham College

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 46: Exploring an Emergent Model of Organizational Change to Improve Postsecondary STEM Education

This poster will share an emerging model of organizational change towards improved postsecondary STEM education. The model is informed by the presenters' research concerning hundreds of educators and administrators involved in successful

postsecondary STEM education improvement initiatives and the greater research fields concerning STEM education, higher education, and change in organizations.

Jana Bouwma-Gearhart, Assistant Professor of Science Education, and **Eric Weber**, Assistant Professor of Mathematics Education—both of Oregon State University; **Matthew Tadashi Hora**, Assistant Scientist—University of Wisconsin–Madison; and **Neal Hutchens**, Associate Professor of Higher Education—Penn State University Park

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 48: Disciplinary Teaching and Learning Centers and Faculty Learning Communities in Professional Development

There has been a strong national call to improve teaching and learning in higher education through professional development activities for faculty members. Faculty members rarely receive formal training in teaching; therefore, their teaching style is often based on their experiences as students, which mainly involved extensive lecturing. Professional development opportunities are necessary to nurture sustainable changes in undergraduate science education. At the University of Maryland, two of the most effective ways of doing this are through faculty learning communities (FLCs) and a disciplinary teaching and learning center (TLC) that specifically serves chemical and life sciences faculty and graduate teaching assistants. This poster will present the evaluation of FLCs and the disciplinary TLC and suggest opportunities for implementing professional development models to foster institutional and departmental change.

Laura Egan, Graduate Research Assistant, and **Katerina Thompson**, Director, Undergraduate Research and Internship Programs—both of University of Maryland

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 50: STEM Program Evaluation: Perspectives and Lessons Learned

This poster will provide insight into the design, development, and implementation processes of an evaluation of a pilot Learning Community program with a STEM focus within four departments including Mathematics, Computer Science, Physics, and Chemistry. The poster will include reflections and considerations for future development of pilot studies and the evaluation of these ventures. The presenters will provide an overview of the pilot program, the evaluation activities, the recommendations made by evaluators, and the use of the results thereafter. In addition, interviews with the program designers to determine their decision-making processes will be addressed along with personal reflections from the three evaluators involved in the programs.

Carol E. Seaman, Associate Professor of Mathematics—University of North Carolina at Greensboro

THEME 3: SUPPORTING AND SCALING FACULTY LEADERSHIP AND INNOVATION

POSTER 52: STEP Central: Building a Community of Practice to Improve STEM Recruitment, Retention, and Engagement

Change in undergraduate STEM education at an institutional or national scale requires sharing and disseminating project-level and institutional-level "best practices" with a broader community. The STEP Central project aims to develop and support a community of practice among NSF STEM Talent Expansion Program (STEP) grantees and others interested in recruitment, engagement, and retention of STEM students. By integrating national meetings, regional workshops, webinars, newsletters, an interactive website (STEPcentral.net), and an active social media presence, participants work to foster community engagement, sharing of resources, and cross-disciplinary/institutional collaboration. Participants will learn about the project's approach to building community and will gain awareness of and immediate access to the resources and opportunities available through the STEP Central community.

Daniel Udovic, Professor Emeritus, Biology and Environmental Studies, and **Tania Siemens**, STEP Central Project Manager—both of University of Oregon

Westin Gaslamp Quarter Floorplan

