



7th Annual Symposium on STEM Education

A celebration of the CU Boulder and Colorado's leadership in
Science, Technology, Engineering and Math education.

Monday, September 21st, 2015

Center for Community

Abrams Lounge, Flatirons Room, & Room S350

University of Colorado Boulder



SCHEDULE OF EVENTS

3:00-5:00pm STEM Education Showcase

- Educational Transformation • Math Placement • STEM Education Research • K-12 and Informal STEM Education • Faculty Development & Resources

POSTER SESSION - SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

POSTER SESSION - SECTION B (4:00-5:00 PM) – S350

5:00-7:00pm Awards Ceremony and Reception – Abrams Lounge

WELCOME

Noah Finkelstein, Valerie Otero & Anne-Barrie Hunter

KEYNOTE ADDRESS

Susan Elrod

Interim Provost at California State University, Chico & Scholar of Institutional Change

ADDRESS

Christy Gomez

Mathematics Chair at Front Range Community College

PRESENTATION OF CHANCELLOR'S AWARDS

Steven Leigh – Arts & Sciences Awards

Lorrie Shepard – School of Education Awards

William Kuskin – Engineering Awards

CLOSING

CU-BOULDER STEM EDUCATION SHOWCASE

POSTER GUIDE

EDUCATIONAL TRANSFORMATION

SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

1A. Restructuring of a Junior-Level Electronics Course to Support Engagement in Scientific Practices

Heather Lewandowski

Physics, University of Colorado Boulder

2A. Sparking STEM Curiosity in 3D

Dave Lucas & Sheila Lucas

3D STEM Animals

3A. Creating Sustainable Change Through Departmental Action Teams

Joel Corbo, Daniel Reinholz, Melissa Dancy & Noah Finkelstein

Center for STEM Learning, University of Colorado Boulder

4A. CU-STARs: Addressing Attrition through Community and Outreach

Andrew Sturner, Erica Ellingson, Courtney Peck & Addi Fyhrie

Astrophysical and Planetary Science, University of Colorado Boulder

5A. Implementing Entrepreneurial Processes Into STEM Science Classrooms

Kent Hups

Adams 12 5-Star Schools

6A. STEM for Underrepresented Minorities (SUM)

Christina Bear

Girl Scouts of Colorado

SECTION B (4:00-5:00 PM) – S350

1B. Talk To Me!

Julie Thompson, Heather Waldron & Emily Schriener

Streamline to Mastery, Boulder High School

2B. Fracking in Boulder County: Groundbreaking Content for the ESL Classroom

Kathryn Stauffer & Olivia Conner

International English Center (Continuing Education), University of Colorado Boulder



3B. ARSC 1450: Intro to STEM Research Methods: A novel, new course designed to increase retention of entering first-generation freshman in STEM fields

Kirstin Swihart & Tammy Maldonado

Biological Sciences Initiative

4B. International English Center's Go English STEM Program

Holly Woodsome Sroymalai, Susan Fouts, Kirstin Stauffer & Amanda McCracken

International English Center, University of Colorado Boulder

5B. Promoting Sustained Radical Reforms: Enablers, Barriers and Impacts of Classroom Design

Melissa Dancy

Physics, University of Colorado Boulder

MATH PLACEMENT

SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

7A. Improving the Applied Math Assessment Exam through Item Analysis

Anne Dougherty & Silva Chang

Applied Mathematics, University of Colorado Boulder

STEM EDUCATION RESEARCH

SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

8A. The Role of Modeling in Troubleshooting: An Example from Electronics

Dimitri Dounas-Frazer, Kevin Van De Bogart, MacKenzie Stetzer & Heather Lewandowski

University of Colorado Boulder & University of Maine

9A. Investigating Student Ownership of Projects in an Upper-Division Physics Lab Course

Jacob Stanley, Dimitri Dounas-Frazer, Laura Kiepora & Heather Lewandowski

University of Colorado & Georgia State

10A. Correlating Students' Beliefs About Experimental Physics with Laboratory Course Success

Bethany Wilcox

Physics, University of Colorado Boulder

11A. Expanding Perception: How Students



"See" Fluids

Kathryn Goodman, Jean Hertzberg, Tim Curran & Noah Finkelstein
ATLAS, University of Colorado Boulder

12A. TIGER Research on Academic Retention in Statistics

Laura Border, Adam J. Blanford & Trevor DiMartino
Graduate Teacher Program & TIGER, University of Colorado Boulder

13A. Enhancing K12 STEM Through University & Industry Partnerships

Mike Borowczak & Andrea Burrows
Erebus Labs & University of Wyoming

14A. Learning Assistant Supported Student Outcomes (LASSO)

Ben Van Dusen & Michael Turner, Laurie Langdon, Valerie Otero
School of Education, University of Colorado

15A. Changing Student Attitudes in Science through Process Oriented Guided Inquiry Learning (POGIL)

Angela Cannava
University of Colorado & Academy HS

SECTION B (4:00-5:00 PM) – S350

6B. Computer Science is "Hard": Looking at the Gender Gap Between Two Computing Programs

Brittany Ann Kos
ATLAS, University of Colorado Boulder

7B. Scaffolding Secondary Science Student Construction of Evidence-based Scientific Explanation

Alisa Grimes & Kathryn Fleegal
Streamline, University of Colorado & Academy HS

8B. The Value of Khan Academy in Pre-Service Science Teacher Education

Christine Lindstrom
Physics, University of Colorado Boulder

9B. Understanding Blended Ontologies: A Case of Student Reasoning About Photons

Jessica Hoy
Physics, University of Colorado Boulder

10B. Supporting Claims with Evidence: PET classroom vs. Traditionally Taught Physics Classroom

Nicole Schrode

Physics Education

11B. Influence of Student Achievement Motivation and Study-Leisure Conflict on Self-Regulated Study During Student-Centered General Biology Labs

John Basey, Clinton D. Francis & Maxwell Joseph

University of Colorado & California Polytechnic State University

12B. Understanding Physics Identity and Racial Identity in Informal Programs

Simone Hyater-Adams, Katie Hinko & Noah Finkelstein

ATLAS & Physics, University of Colorado

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ATLAS & Physics, University of Colorado

K-12 AND INFORMAL STEM EDUCATION

SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

16A. Aspire Research-Practice Partnership: Developing Designs to Support Teacher Formative Assessment at the District Level

Erin Furtak

School of Education, University of Colorado Boulder

17A. Identifying and Analyzing Actions of Effective Group Work

Rebecca Strober, Jenni Keil, Bridget Molloy & Nicholas Hooker

Streamline & Noyce Scholars, University of Colorado Boulder

18A. New Directions for PhET Interactive Simulations in STEM Education

Amy Hanson & Amy Rouinfar

PhET, University of Colorado Boulder

19A. STEM Literacy through Infographics

Joseph Polman, Leighanna Hinojosa, Stephen Sommer & Joanna Weidler-Lewis

School of Education, University of Colorado Boulder

20A. What is the Impact on Participants in the



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PISEC Informal Physics Program?

Katie, Hinko, Simone Hyater-Adams, Rosemary Wulf & Noah Finkelstein

JILA, ATLAS & Physics, University of Colorado Boulder & Thornton HS

SECTION B (4:00-5:00 PM) – S350

14B. Citizen Science and Curriculum: An Inclusive Instructional Strategy

Tamara Sumner & Inquiry Hub Team

Institute of Cognitive Science and Department of Computer Science, University of Colorado Boulder

15B. Elementary Students Learning Computer Science

Ian Her Many Horses

School of Education, University of Colorado Boulder

16B. Virtual Teacher Learning Community: Developing a Virtual Community of Practice with Google Tools

Rebecca Swanson & Erin Furtak

School of Education, University of Colorado Boulder

17B. “I want to talk to you about how you did it.” Using Peer Feedback to Improve Elementary Math Practice Skills

Kristine Johnson, Linda Taht, Verónica Gonzáles, Gabrielle Kristofich & Henry Suárez

Noyce TRT, University of Colorado Boulder

Colorado Boulder

18B. Building Partnerships to Connect K-12 Audiences to Current Science, Technology, Engineering and Math (STEM) at CU Boulder

Stacy Forsythe, Brian Jernigan, Hester Nadel & Anjali Maus

CU Science Discovery, University of Colorado Boulder

FACULTY DEVELOPMENT & RESOURCES

SECTION A (3:00-4:00 PM) – FLATIRONS ROOM

21A. A Librarian-Faculty Partnership for Information Literacy in STEM

Barbara Losoff, Rebecca Kuglitsch & Julia Havelick

Libraries & Science Department, University of Colorado Boulder



DISTINGUISHED KEYNOTE ADDRESS

SUSAN ELROD

Susan Elrod is a Senior Scholar at the Association of American Colleges and Universities. She holds a Ph.D. in Genetics from the University of California-Davis and a B.S. in Biological Sciences from California State University, Chico. She has experience as a college biology professor, college administrator, and national leader in science education. She is currently interim provost and vice president for academic affairs at California State University, Chico. She began at Chico in October 2014, after having served as Dean of the College of Science and Mathematics at California State University, Fresno. In Fresno, she she led initiatives at the university, state and national levels that focused on improving student success and faculty development in STEM (science, technology, engineering and mathematics) disciplines, while enhancing support for research and expanding community and industry engagement.

Prior to these positions, she was the Executive Director of Project Kaleidoscope at AAC&U. In this position, she launched new national initiatives focused on improving undergraduate STEM education, expanded PKAL's existing regional networks, and enhanced PKAL's Summer Leadership Institute program. She has led a wide array of STEM education initiatives on a range of topics in higher education, such as PKAL's national initiatives on interdisciplinary program development, STEM transfer student success, sustainability in the undergraduate curriculum, and leadership development. At Cal Poly, San Luis Obispo, where she was a professor of biological sciences since 1997, Elrod has taught extensively, conducted scientific and educational research, and served as associate dean in the College of Science and Mathematics and as the director of the Center for Excellence in Science and Mathematics Education (CESaME) from 2007-2009. In addition, she has 10+ years of experience leading faculty development programs and workshops that result in generative outcomes for STEM departments and organizations. In 2006-07, she was an American Council on Education (ACE) Fellowship at the Colorado College and is a PKAL F21 faculty member, class of 2001.

2015 CHANCELLOR'S AWARDS FOR

EXCELLENCE IN STEM EDUCATION

FACULTY SCHOLARS:

Rebecca Ciancanelli, Julia Willis

Student Academic & Services Center
Inclusive Biology Success Project

John Falconer

Chemical & Biological Engineering
Interactive Simulations combined with Screencasts and ConcepTests

Enrique Lopez

School of Education
Reframing Science Retention and Achievement: Using an Asset-Based Approach to Examine Why Students Succeed in Science?

Andrew Martin, Cynthia Buchenroth-Martin

Ecology & Evolutionary Biology
Experimental evaluation of a difficult to assess learning goal: effective communication and productive collaboration towards a common goal

GRADUATE SCHOLARS:

Sara Grover

Psychology & Neuroscience
Examining the Quality of Cross-Sex Interactions in Undergraduate STEM Courses and How it Affects Women's Belonging, Self-Efficacy, and Confidence in STEM

Brittany Kos

ATLAS

Computer Science is "Hard": Uncovering Cultural Identities Within Introductory Computing Courses

Susan Miller

School of Education
Computational Thinking for Undergraduate Students in the Context of Preservice Teacher Education

Jane Barker

Psychology & Neuroscience
Developing skills to persist and succeed in STEM: Comparing self-directedness, learning, curiosity, and persistence in more- and less-structured Science Discovery Camps



CENTER FOR STEM LEARNING FACULTY FELLOWS

David Budd, Geological Sciences
Deborah Wuttke, Chemistry & Biochemistry
Mark Gross, ATLAS
Jean Hertzberg, Mechanical Engineering
Stephanie Chasteen, Physics Education
Brian Argrow, Aerospace Engineering Sciences
Paul Chinowsky, Civil, Environmental, and Architectural Engineering
Melissa Dancy, Physics
Stan Deetz, Graduate School
Anne Dougherty, Applied Mathematics
Mike Dubson, Physics
Doug Duncan, Astrophysical and Planetary Sciences
Noah Finkelstein, Physics
Kris Gutierrez, School of Education
Seth Hornstein, Astrophysical and Planetary Sciences
Anne-Barrie Hunter, School of Education
Mike Klymkowsky, Molecular Cellular and Developmental Biology
Jenny Knight, Molecular Cellular and Developmental Biology
Daria Kotys-Schwartz, Mechanical Engineering
Laurie Langdon, LA Program and NOYCE
Clayton Lewis, Computer Science
Andy Martin, Ecology and Evolutionary Biology
Brad McLain, XSci and Center for STEM Learning
Valerie Otero, School of Education
Robert Parson, Chemistry and JILA
Bill Penuel, School of Education
Kathy Perkins, PhET Interactive Simulations
Steve Pollock, Physics
Derek Reamon, Integrated Teaching and Learning Program
Alex Repenning, Computer Science
Diane Sieber, Engineering
Beth Stade, Center for STEM Learning
Eric Stade, Mathematics
Robb Tubbs, Mathematics
David Webb, School of Education



HOW TO GET INVOLVED
WITH THE
CENTER FOR STEM LEARNING

- Contact the Center for STEM Learning (CSL) with ideas for projects and programs to promote excellence in STEM education at CU-Boulder and beyond. **Send proposals to csl@colorado.edu.**
- **Let us link to your program** from our website and add us to yours. Contact csl@colorado.edu for further information.
- **Attend DBER:** The Discipline-Based Education Research (DBER) seminar is a weekly forum for faculty, staff and students interested in discipline-based education research and course transformation. This semester, **DBER is held on Tuesdays from 3:30-4:30 PM pm in ATLAS 1B31.** Visit the DBER page on the CSL website for a list of topics: (<http://www.colorado.edu/csl/DBER.html>).
- Help us guarantee a bright future for STEM education at CU-Boulder, and in Colorado and the nation. **To contribute financially to the Center for STEM Learning, please contact info@cufund.org or call 1-800-405-9488.** Your support is greatly appreciated and has a tremendous impact.
- More information about these opportunities can be found at www.colorado.edu/csl, or by contacting CSL@Colorado.edu.

THE CENTER FOR STEM LEARNING IS GRATEFUL FOR SUPPORT FROM:



National Science Foundation
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