

Partnerships to Advance STEM Education Transformation: Helmsley Postdoctoral Teaching Scholars and Summer Institutes

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Goal

Our goal is to train faculty and future faculty in evidence-based teaching methods shown to increase STEM persistence through partnerships with regional higher education institutions.

Abstract

The Yale Center for Teaching and Learning (CTL) is currently undertaking a multilayered approach to leverage pedagogical expertise to catalyze transformative efforts in STEM education. We have created a new and unique postdoctoral training program that emphasizes training in evidence-based pedagogical methods for STEM. The CTL has recruited four Helmsley Postdoctoral Scholars in Yale's departments of Mathematics and Physics. The Helmsley Scholars receive intensive training at HHMI-funded National Academies Summer Institutes (SIs) and reinforce their training through activities in the CTL and in their home departments. The program impact will extend beyond Yale through Helmsley Scholar-led teaching of STEM courses at diverse regional partner institutions and facilitation of instructor training at regional SIs. SI participants will include postdoctoral associates as well as faculty from four-year colleges and community colleges. These efforts, focused on training faculty and future faculty in evidence-based pedagogy, stand to increase student persistence in STEM majors.

Meet the Helmsley Scholars



LAKE BOOKMAN, PH.D.
Department of Mathematics
Ph.D.: North Carolina State University
Yale Courses: Differential Calculus, Calculus of Several Variables
Approach: Lake believes in implementing strategies that encourage students to build metacognitive skills to reflect on and improve their learning.

His research interests are in numerical analysis and mathematical modeling, which he uses as tools to show his students, as well as his fellow researchers, the positive change math can have on the world.

CLAUDIA DE GRANDI, PH.D.
Department of Physics
Ph.D.: Boston University

Yale Courses: PHYS 170-171: Physics for the Life Sciences
Approach: Claudia is committed to finding her optimal recipe for teaching physics effectively to a variety of students' backgrounds via active learning methods and in-class engagement. She has taught several courses in the Yale TEAL (Technology Enabled Active Learning) classroom, experimenting with flipped classroom styles and promoting group work and participation.



ZOSIA KRUSBERG, PH.D.
Department of Physics
Ph.D.: University of Chicago
Yale Courses: PHYS 180: University Physics
Approach: Zosia is deeply committed to promoting the inclusion and retention of women and other underrepresented minorities in physics and other STEM fields. She leads an interdisciplinary

research program in mind, brain, and education, with particular emphasis on the role of metacognition, intuition, and embodied cognition in physics problem solving.

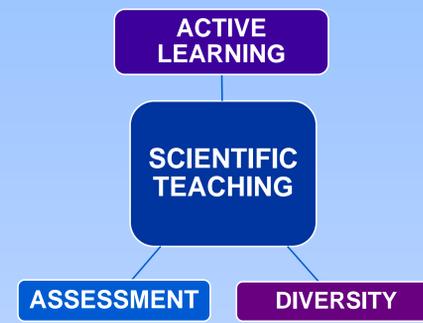
BRETT SMITH, PH.D.
Department of Mathematics
Ph.D.: Wesleyan University

Yale Courses: Calculus of Functions of One Variable II, Mathematics in the Real World
Approach: Brett is committed to making introductory math courses more accessible with active learning. He regularly uses peer instruction, just-in-time short response questions and small group activities in class. Brett is assistant coordinator of Yale's flipped-classroom Integral calculus course.



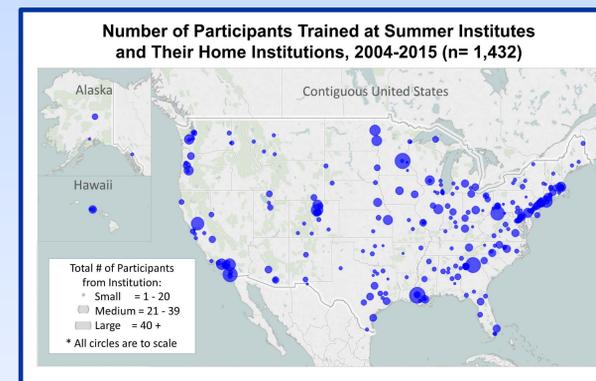
An Established Record of Leading Summer Institutes

SUMMER INSTITUTES MODELED ON PRINCIPLES OF SCIENTIFIC TEACHING

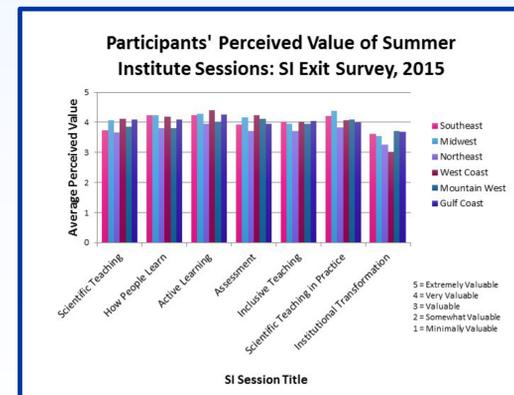


In collaboration with colleagues nationwide, the Yale CTL offers week-long National Academies Summer Institutes on Undergraduate Education to train STEM faculty and future faculty in evidence-based teaching. Summer Institutes are modeled on the principles of **scientific teaching**: active learning, assessment and diversity (above).

OVER A DECADE OF NATIONAL REACH

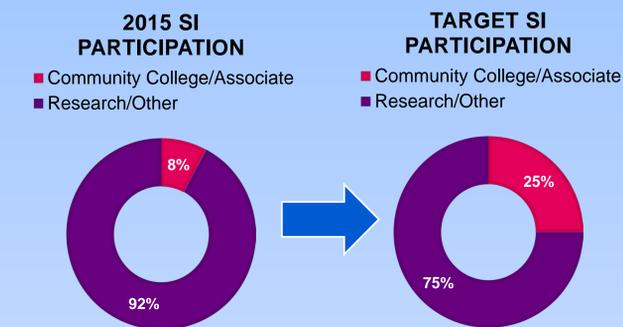


Approximately 170-180 participants representing approximately 60-70 institutions attend Summer Institutes each year. Since 2004, **Summer Institutes have trained over 1400 participants** (above). Across the board, participants report their experiences in individual Summer Institute sessions to be very valuable, with topics ranging from scientific teaching to institutional transformation (below). Ongoing efforts are assessing the long-term implementation of strategies learned at Summer Institutes.



Broadening Our Reach: Teaching-Intensive Helmsley Summer Institutes

Previously, Summer Institutes have focused on the development of faculty at Research I institutions. Beginning in 2016, Helmsley Summer Institutes will seek to broaden our reach by **increasing participation from community colleges/teaching-intensive institutions to at least 25% of each Summer Institute** (below).



We will offer 3 Helmsley Summer Institutes in 2016 and 3 in 2017, for a total of six Summer Institutes reaching approximately 180 participants and at least 45 faculty from teaching-intensive institutions.

Helmsley Program Transformative Impact

The Helmsley Program at the Yale CTL seeks to transform STEM education by partnering with regional higher education institutions. This collaborative effort will result in the following outcomes:

- Intensive three-year **training of 4 future faculty** members (Helmsley Postdoctoral Scholars)
- **Enhanced student engagement** in introductory math and science courses at **3 institutions** (Yale, University of Bridgeport, Housatonic Community College)
- **6 Summer Institutes** (with focus on community colleges/teaching-intensive institutions)
- **180 Summer Institute participants** (with at least 45 participants from teaching-intensive institutions)
- **30 teachable in-class activities designed to engage students** (produced by SI participants for widespread online distribution)

We are excited to be a collaborative part of, and a leader in, this transformative time in STEM education.



Helmsley Team (L to R): Zosia Krusberg (Scholar), Lake Bookman (Scholar), Elizabeth Morse Luoma (Program Director), Claudia De Grandi (Scholar), Brett Smith (Scholar)