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GENERAL ESSAYS AND ARTICLES

ESSAYS

Co-teaching in Undergraduate STEM Education: A Lever for Pedagogical Change toward Evidence-Based Teaching?

Kirstin Haag, Sarah B. Pickett, Gloriana Trujillo, and Tessa C. Andrews

Co-teaching has been proposed as a lever for fostering pedagogical change and has key attributes of a successful change strategy, but does research indicate co-teaching effectively shifts instructional practices? This essay, written with a few audiences in mind, reviews existing evidence, extracts recommendations, and lays out future directions.

ARTICLES

What I Wish My Instructor Knew: How Active Learning Influences the Classroom Experiences and Self-Advocacy of STEM Majors with ADHD and Specific Learning Disabilities

Mariel A. Pfeifer, Julio J. Cordero, and Julie Dangremond Stanton

The experiences of STEM students with ADHD and specific learning disabilities are centered to determine how these students perceive active learning as influencing their classroom and self-advocacy experiences. The way an active-learning practice is implemented and limited awareness of universal design for learning likely contribute to active-learning barriers.

Exploring the Complementarity of Measures of Instructional Practices

Lu Shi, Maia Popova, Robert M. Erdmann, Anthony Pellegrini, Victoria Johnson, Binh Le, Trina Popple, Zachary Nelson, Molly Undersander Gaston, and Marilynne Stains

Analysis of the complementarity of two measures of instructional practices—COPUS and LCTR—showcases the challenges in characterizing instructional quality.

Evading Race: STEM Faculty Struggle to Acknowledge Racialized Classroom Events

Gretchen P. King, Tatiane Russo-Tait, and Tessa C. Andrews

This study investigated whether and how STEM instructors noticed exclusionary racialized events experienced by Black students in classroom narratives. Color-evasive racial ideology was pervasive. This paper qualitatively characterizes incarnations of color-evasion enacted by STEM instructors and the racialized events they noticed.

Predictors of Scientific Civic Engagement (PSCE) Survey: A Multidimensional Instrument to Measure Undergraduates' Attitudes, Knowledge, and Intention to Engage with the Community Using Their Science Skills

Irfanul Alam, Karen Ramirez, Katharine Semsar, and Lisa A. Corwin

Scientific civic engagement is an individual's active participation in a community using science skills with the intention to improve the community or enact positive social change. The Predictors of Scientific Civic Engagement survey measures four predictors of future civic engagement: value, self-efficacy, action, and knowledge.

A Student-Centered, Entrepreneurship Development (ASCEND) Undergraduate Summer Research Program: Foundational Training for Health Research

Avis Jackson, Sherita Henry, Kevon M. Jackman, Laundette Jones, Farin Kamangar, Niangoran Koissi, Shiva Mehravaran, Akinyele Oni, Carroll Perrino, Payam Sheikhattari, Erika Whitney, and Christine F. Hohmann

Student participation of underrepresented minorities (URM) in the scientific workforce is imperative. Undergraduate research training programs are essential in retaining URMs in the sciences and STEM. Presented here is an innovative, effective approach harnessing students' entrepreneurial desires into a multiyear, NIH BUILD-funded research training program.

Analysis of Inclusivity of Published Science Communication Curricula for Scientists and STEM Students

Randy Vickery, Katlyn Murphy, Rachel McMillan, Sydney Alderfer, Jasmine Donkoh, and Nicole Kelp

Published science communication trainings for STEM students have increased over the past 20 years, but the authors show that these trainings often lack a focus on inclusiveness and evaluation of the efficacy of the trainings. This essay identifies areas for future work in the field of science communication training.

Research Anxiety Predicts Undergraduates' Intentions to Pursue Scientific Research Careers

Katelyn M. Cooper, Sarah L. Eddy, and Sara E. Brownell

This study of 1,272 undergraduate researchers from across the United States used structural equation modeling and identified research anxiety as a construct that is significantly and negatively related to student intent to pursue a research-related career. Aspects of research that increase and decrease student research anxiety are highlighted.

"No matter what your story is, there is a place for you in science": Students' Ability to Relate to Scientists Positively Shifts after Scientist Spotlight Assignments, Especially for First-Generation Students and Women

Kelsey J. Metzger, Molly Dingel, and Ethan Brown

This study reports a significant, positive shift in undergraduate biology students' ability to relate to scientists following exposure to Scientist Spotlight assignments, as well as concomitant shifts in the ways students describe scientists, with a disproportionate, positive change for students who identify as first-generation students or as female.

Costs and Benefits of Undergraduates Revealing Depression to Online Science Instructors

Carly A. Busch, Tasneem F. Mohammed, Erika M. Nadile, Madison L. Witt, Cindy Vargas, Missy Tran, Joseph Gazing Wolf, Danielle Brister, and Katelyn M. Cooper

This study of 1179 undergraduates with depression examined whether students revealed their depression to their online science instructors and the reasoning behind their decisions. Few students revealed their depression, but perceived that if they did, they would benefit by receiving accommodations but risk instructor judgment.

Insight from Biology Program Learning Outcomes: Implications for Teaching, Learning, and Assessment

Noelle Clark and Jeremy L. Hsu

Program learning outcomes (PLOs) play a critical role, informing curricula, teaching, and assessment. Undergraduate biology PLOs were collected and analyzed to provide insight into how institutions may be using PLOs and uncover what skills and competencies are most frequently listed. Implications for biology programs and instructors are discussed.

Exploring STEM Teaching Assistants' Self-Efficacy and Its Relation to Approaches to Teaching

Cody R. Smith, Deepika Menon, Annette Wierzbicki, and Jenny M. Dauer

This study provides a deeper understanding of the model of teaching assistant (TA) self-efficacy by connecting self-efficacy to teaching approach and suggesting that high self-efficacy TAs show a greater concern for impacting student learning (outward focus) than for their own tasks (inward focus).

Teaching Postsecondary Students to Use Analogies as a Cognitive Learning Strategy: An Intervention

Joseph C. Tise, Rayne A. Sperling, Michael S. Dann, and Taylor M. Young

This intervention extends learning strategies research into authentic learning environments. It shows college biology students can learn to generate analogies as a learning strategy and get better at doing so. Finally, students' generated-analogy quality predicts analogical reasoning and knowledge of cognition.

A CURE on the Evolution of Antibiotic Resistance in *Escherichia coli* Improves Student Conceptual Understanding

Scott Freeman, Joya Mukerji, Matt Sievers, Ismael Barreras Beltran, Katie Dickinson, Grace E. C. Dy, Amanda Gardiner, Elizabeth H. Glenski, Mariah J. Hill, Ben Kerr, Deja Monet, Connor Reemts, Elli Theobald, Elisa T. Tran, Vicente Velasco, Lexi Wachtell, and Liz Warfield

Students who did a CURE on experimental evolution of antibiotic resistance in place of traditional labs gained a better understanding of the culture of scientific research and evolution by natural selection, with minimal impact on exam scores.

SPECIAL ISSUE ON COMMUNITY COLLEGE BIOLOGY EDUCATION RESEARCH

A Call to Assess the Impacts of Course-Based Undergraduate Research Experiences for Career and Technical Education, Allied Health, and Underrepresented Students at Community Colleges

Cori T. Leonetti, Heather Lindberg, David Otto Schwake, and Robin L. Cotter

Limited data are available on the differential impacts course-based undergraduate research experiences (CUREs) have on subpopulations of community college (CC) students, including those in allied health, career and technical education, and nursing pathways (workforce). This essay addresses CC demographics, student success, and assessment practices for CUREs.

On the Cover

American Society for Cell Biology, Honorable Mention Photo: GFP Lifeact Mouse Uterus by Page Baluch, Arizona State University, Co-submitter: Bukola Obayomi.

This cross sectional view of a mouse uterus shows the two smooth muscle layers surrounding the mucosa using a GFP lifeact protein fragment which selectively binds to actin filaments. Muscle is made up of actin and myosin filaments which slide on one another to contract. Using the GFP lifeact to highlight actin allows researchers to easily visualize structures containing smooth muscle such as the reproductive organs and blood vessels so they can study the mechanisms that induce contractions during childbirth or increase blood pressure.