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GENERAL ESSAYS AND ARTICLES

CURRENT INSIGHTS

Current Insights

Sarah L. Eddy

This installment of *Current Insights* highlights three studies that 1) take an interdisciplinary approach to characterizing active learning, 2) explore why faculty–student interactions may not be universally beneficial, and 3) characterize the help-seeking behaviors of first-generation college students.

ARTICLES

Improving Academic Performance and Retention of First-Year Biology Students through a Scalable Peer Mentorship Program

Mike Wilton, Daniel Katz, Anthony Clairmont, Eduardo Gonzalez-Nino, Kathy R. Foltz, and Rolf E. Christoffersen

This study evaluates the performance of a near-peer mentoring program for first-year biology majors. The program's intention is to improve student retention generally, and academic and soft skills more specifically. The effect of the program was investigated via ethnographic methods, a program-specific survey, and regression analyses.

Supporting Undergraduate Biology Students' Academic Success: Comparing Two Workshop Interventions

Lauren Hensley, Amy Kulesza, Joshua Peri, Anna C. Brady, Christopher A. Wolters, David Sovic, and Caroline Breitenberger

When teaching college biology students to use effective learning strategies, does it help to address both the what and the when of studying? Findings indicated that students who learned about time management in addition to metacognition had higher exam grades and commitment to earning a college degree at the end of the semester.

Diversity Interventions in the Classroom: From Resistance to Action

Dustin B. Thoman, Melo-Jean Yap, Felisha A. Herrera, and Jessi L. Smith

The diversity intervention-resistance to action model is presented along with interviews of biology faculty undertaken to understand how resistance to implementing diversity-enhancing classroom interventions manifests at four specific input points within a rational decision-making process that too often results in inaction.

Student-Authored Scientist Spotlights: Investigating the Impacts of Engaging Undergraduates as Developers of Inclusive Curriculum through a Service-Learning Course

Maurina L. Aranda, Michelle Diaz, Lorenzo Gastelum Mena, Jocelyn I. Ortiz, Christian Rivera-Nolan, Daniela C. Sanchez, Melissa J. Sanchez, Allison M. Upchurch, Carleigh S. Williams, Stephanie N. Boorstin, Laura M. Cardoso, Matthew Dominguez, Sarah Elias, Elmer E. Lopez, Ruby E. Ramirez, Paola Juliet Romero, Falina Nicole Tigress, Jenee Alexandra Wilson, Ryan Winstead, Jason T. Cantley, Joseph C. Chen, Megumi Fuse, Michael A. Goldman, Brinda Govindan, Peter Ingmire, Jonathan D. Knight, Sally G. Pasion, Pleuni S. Pennings, Ravinder N. M. Sehgal, Patricia Tiongco de Vera, Loretta Kelley, Jeffrey N. Schinske, Blake Riggs, Laura W. Burrus, and Kimberly D. Tanner

The impact of student-authored Scientist Spotlights was investigated within the context of a service-learning course engaging students in STEM curricular reform efforts. Student-authored Scientists Spotlights significantly shifted peers' perceptions of scientists across all demographic groups, as well as student authors' own relatability to and stereotypes about scientists.

Context Matters: Social Psychological Factors That Underlie Academic Performance across Seven Institutions

S. Salehi, S. A. Berk, R. Brunelli, S. Cotner, C. Creech, A. G. Drake, S. Fagbodun, C. Hall, S. Hebert, J. Hewlett, A. C. James, M. Shuster, J. R. St. Juliana, D. B. Stovall, R. Whittington, M. Zhong, and C. J. Ballen

Findings presented here demonstrate that institutional context plays an important role in the mechanisms underlying performance gaps in undergraduate biology and may affect how social psychological interventions impact performance across different learning environments.

Aspects of Large-Enrollment Online College Science Courses That Exacerbate and Alleviate Student Anxiety

Tasneem F. Mohammed, Erika M. Nadile, Carly A. Busch, Danielle Brister, Sara E. Brownell, Chade T. Claiborne, Baylee A. Edwards, Joseph Gazing Wolf, Curtis Lunt, Missy Tran, Cindy Vargas, Kobe M. Walker, Tamiru D. Warkina, Madison L. Witt, Yi Zheng, and Katelyn M. Cooper

This study of 2111 undergraduates examined the impact of online science courses on their anxiety. More than 50% of students reported experiencing at least moderate anxiety in online science courses. Aspects of online learning that increase and decrease anxiety are identified, and actions that instructors can take to lessen anxiety in online science courses are offered.

Investigating Student Perceptions of Instructor Talk: Alignment with Researchers' Categorizations and Analysis of Remembered Language

Dax Ovid, Mallory M. Rice, Joshua Vargas Luna, Karen Tabayoyong, Parinaz Lajevardi, and Kimberly D. Tanner

Students were asked to evaluate a stimulus set of previously recorded Instructor Talk quotes as positive or negative, and whether students could recall noncontent instructor language was investigated. Overall, students' evaluations of Instructor Talk quotes were in alignment with researchers, and most students could recall memories of Instructor Talk.

Teaching the Tough Topics: Fostering Ideological Awareness through the Inclusion of Societally Impactful Topics in Introductory Biology

Abby E. Beatty, Emily P. Driessen, Taylor Gusler, Sharday Ewell, Amy Grilliot, and Cissy J. Ballen

Development and integration of ideological awareness curriculum enhances students' ability to apply traditional biology learning objectives to societally relevant topics by understanding the biases, stereotypes, and assumptions that shape the world around them.

Successful Problem Solving in Genetics Varies Based on Question Content

Jennifer S. Avena, Betsy B. McIntosh, Oscar N. Whitney, Ashton Wiens, and Jennifer K. Knight

Student and expert problem solving in genetics was characterized by analyzing written step-by-step processes in four different content areas. A few processes that were associated with correct answers differed depending on content area, but reasoning was consistently predictive of successful problem solving across all content areas.

Reimagining the Introductory Math Curriculum for Life Sciences Students

Erin Sanders O'Leary, Hannah Whang Sayson, Casey Shapiro, Alan Garfinkel, William J. Conley, Marc Levis-Fitzgerald, M. Kevin Eagan, and Blaire Van Valkenburgh

Description of an innovative new math curriculum for life science students and a study examining its cognitive and noncognitive impacts, including improved academic performance in math, higher grade outcomes in subsequent science courses, and increased interest in quantitative concepts and skills relevant to 21st-century biology.

Punnett Squares or Protein Production? The Expert–Novice Divide for Conceptions of Genes and Gene Expression

Dina L. Newman, Aewynn Coakley, Aidan Link, Korinne Mills, and L. Kate Wright

Through the lens of model-based reasoning, this work explores and uncovers important differences in how experts and novices conceptualize and reason about genes and gene expression. Findings from this work will help inform future research into the development and refinement of mental models.

A Framework of College Student Buy-in to Evidence-Based Teaching Practices in STEM: The Roles of Trust and Growth Mindset

Cong Wang, Andrew J. Cavanagh, Melanie Bauer, Philip M. Reeves, Julia C. Gill, Xinnian Chen, David I. Hanauer, and Mark J. Graham

This investigation tests a college science, technology, engineering, and mathematics (STEM) student buy-in framework and contributes to understanding the social and cognitive factors influencing students in evidence-based teaching contexts. Students' level of commitment to instructors' teaching practices can be key to attaining many desired student outcomes of undergraduate STEM education reform.

Development of a Framework for the Culture of Scientific Research

Jessica Dewey, Gillian Roehrig, and Anita Schuchardt

This article describes the development of a framework identifying 31 cultural aspects of scientific research categorized as either Practices, Norms/Expectations, or Values/Beliefs. The framework was developed through a systematic literature review, and evidence of validity with biological researchers was collected.

Supporting Scientific Practice through Model-Based Inquiry: A Students'-Eye View of Grappling with Data, Uncertainty, and Community in a Laboratory Experience

Molly S. Bolger, Jordan B. Osness, Julia S. Gouvea, and Alexandra C. Cooper

This article reports on students' experiences with scientific modeling as they engaged in authentic inquiry within a laboratory course, Authentic Inquiry through Modeling in Biology (AIM-Bio). Case study analysis of student interviews revealed the importance of agency, uncertainty, collaboration, and model-based reasoning in students' modeling practice.

Participation in Biology Education Research Influences Students' Epistemic Development

Dennis Lee, Mallory Wright, Courtney Faber, Cazembe Kennedy, and Dylan Dittrich-Reed

Science epistemology is the foundation of how biology constructs knowledge but is often implicit in undergraduate research experiences (UREs). This study describes the development of one student's ideas about scientific knowledge in a URE in which science epistemology was explicitly discussed in meetings and written reflections.

Connecting the Dots from Professional Development to Student Learning

Charlene L. Ellingson, Katherine Edwards, Gillian H. Roehrig, M. Clark Hoelscher, Rachelle A. Haroldson, and Janet M. Dubinsky

Teacher participation in professional development (PD) improved student learning compared with control teachers. Delivering neuroscience as a unit produced more student learning than when the content was sprinkled throughout the course. Despite commitment to enacting PD strategies, teacher decisions and implementation strategies influenced student outcomes.

To Cope or Not to Cope? Characterizing Biology Graduate Teaching Assistant (GTA) Coping with Teaching and Research Anxieties

Miranda M. Chen Musgrove, Alyssa Cooley, Olivia Feiten, Kate Petrie, and Elisabeth E. Schussler

Biology graduate teaching assistants (GTAs) often used adaptive coping strategies to manage teaching and research anxieties. Notably, GTAs tended to use strategies such as support seeking, self-reliance, accommodation, and distraction more often to manage research anxieties compared with teaching anxieties. Over time, GTAs narrowed their adaptive coping to certain strategies.

Enthusiastic but Inconsistent: Graduate Teaching Assistants' Perceptions of Their Role in the CURE Classroom

Emma C. Goodwin, Jessica R. Cary, and Erin E. Shortlidge

Expectancy-value theory was used to explore how graduate teaching assistants (GTAs) value for teaching a course-based undergraduate research experience (CURE) impacts their motivation and perceptions of their role as CURE mentors. GTAs have varying perceptions of their role that do not closely correspond to their value for teaching CUREs.

Brief Training and Intensive Mentoring Guide Postdoctoral Scholars to Student-Centered Instruction

R. M. Price, C. J. Self, W. C. Young, E. R. Klein, S. Al-Noori, E. Y. Ma, and A. DeMarais

The Science Teaching Experience Program-Working in Science Education (STEP-WISE) provides mentorship, practice, and feedback for research postdocs who are learning and applying inclusive, evidence-based pedagogies. The program is successful and sustainable for institutions. Its salient components are outlined here.

On the Cover

Zebrafish F-actin by Andrew Moore, Howard Hughes Medical Institute. Co-Submitted by Dvir Gur. This image shows Lifeact-EGFP in epithelial and muscles cells of a Zebrafish. It is a colorcoded maximum intensity projection. The image received honorable mention in the 2019 ASCB GFP Image and Video Contest.