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FEATURE

Book Review

Integrating Concepts in Biology: A Model for More Effective Ways to Introduce Students to Biology

K. N. Prestwich and A. M. Sheehy

This is a review of *Integrating Concepts in Biology*, an innovative electronic textbook intended for either or both semesters of a typical introductory biology sequence. The e-book is an excellent example of effective pedagogy informed by recent educational scholarship.

LETTER TO THE EDITOR

Response to Overcoming the Barrier to Implementing Authentic Research Experiences through Faculty Mentorship: The ASCB Mentoring in Active Learning and Teaching (MALT) Program Is Designed to Facilitate Vision and Change-Inspired Teaching Practices

A. J. Prunuske, S. Wick, and M. J. Wolyniak

ESSAY

College Students' Views of Work–Life Balance in STEM Research Careers: Addressing Negative Preconceptions

Anna Tan-Wilson and Nancy Stamp

A survey of college science, technology, engineering, and mathematics (STEM) majors showed that both men and women had negative views of work–life balance in research-based STEM careers compared with other careers that also require graduate degrees. However, their views changed after listening to dual-career couples in STEM professions talk about how they balance family with their careers.

ARTICLES

Investigating Undergraduate Science Students' Conceptions and Misconceptions of Ocean Acidification

Kathryn I. Danielson and Kimberly D. Tanner

Open-ended written assessments were used to determine undergraduate biology, chemistry/biochemistry, and environmental studies students' awareness and understanding of ocean acidification. The results revealed significant differences among populations, in addition to novel misconceptions about the cause of ocean acidification.

Use of Feedback-Oriented Online Exercises to Help Physiology Students Construct Well-Organized Answers to Short-Answer Questions

Jacqueline Carnegie

Online feedback-oriented exercises were developed to help undergraduate physiology students practice formulating answers to short-answer questions. Student feedback regarding the learning value of these assignments and the ability of these assignments to improve student outcomes when answering short-answer questions on summative examinations were assessed.

Redesigning a General Education Science Course to Promote Critical Thinking

Matthew P. Rowe, B. Marcus Gillespie, Kevin R. Harris, Steven D. Koether, Li-Jen Y. Shannon, and Lori A. Rose

Traditional general education science courses appear ineffective at helping students improve their critical-thinking skills and engage with discomfiting topics (e.g., evolution). A novel course focusing on the nature of science rather than the findings of science significantly overcame both deficiencies.

The Undergraduate Research Student Self-Assessment (URSSA): Validation for Use in Program Evaluation
Timothy J. Weston and Sandra L. Laursen

To assess the validity of the Undergraduate Research Student Self-Assessment, or URSSA, a survey used to evaluate undergraduate research programs, researchers examined factor structure, score correlation, and reliability. Survey item blocks represented separate but related constructs; average scores from indicators were moderately to highly correlated and highly reliable.

Authentic Research Experience and “Big Data” Analysis in the Classroom: Maize Response to Abiotic Stress

Irina Makarevitch, Cameo Frechette, and Natalia Wiatros

This article describes the design, implementation, and assessment of a novel laboratory series aimed at providing students with authentic research experience in analyzing large data sets, specifically in RNA-seq analysis.

Critical Analysis of Primary Literature in a Master’s-Level Class: Effects on Self-Efficacy and Science-Process Skills

Christopher Abdullah, Julian Parris, Richard Lie, Amy Guzdar, and Ella Tour

Structured analysis of primary literature, including one flawed and two conflicting papers, highly increased students’ self-efficacy, but a significant increase in performance was observed only for some aspects of science-process skills.

Considering Student Voices: Examining the Experiences of Underrepresented Students in Intervention Programs

Gina Sanchez Gibau

This article presents a qualitative analysis of the effectiveness of intervention programs designed to address underrepresentation in the biomedical sciences. The article highlights the perspectives and experiences of underrepresented students participating in such programs.

Flipped-Class Pedagogy Enhances Student Metacognition and Collaborative-Learning Strategies in Higher Education But Effect Does Not Persist

E. A. van Vliet, J. C. Winnips, and N. Brouwer

The aim of this study was to investigate the effects of flipped classes on motivation and learning strategies in higher education using a controlled, pre- and posttest approach. On the basis of the validated Motivated Strategies for Learning Questionnaire (MSLQ), we found that flipped-class pedagogy enhanced the MSLQ components critical thinking, task value, and peer learning. However, the effects of flipped classes were not long-lasting. For sustainability, we propose repeated use of flipped classes in the curriculum.

Uncovering Scientist *Stereotypes* and Their Relationships with Student Race and Student Success in a Diverse, Community College Setting

Jeffrey Schinske, Monica Cardenas, and Jahana Kaliangara

The authors piloted a qualitative survey of scientist stereotypes at a diverse, 2-yr, Asian American and Native American Pacific Islander–Serving Institution. Positive stereotypes were common, and negative stereotypes were rare and concentrated among certain demographic groups. Students citing nonstereotypical images of scientists had higher rates of success in the course than their counterparts.

Modeling Sources of Teaching Self-Efficacy for Science, Technology, Engineering, and Mathematics Graduate Teaching Assistants

Sue Ellen DeChenne, Natalie Koziol, Mark Needham, and Larry Enochs

Testing a literature-derived model of the sources of science, technology, engineering, and mathematics graduate teaching assistant (GTA) teaching self-efficacy using structural equation modeling indicates that K–12 teaching experience, GTA professional development, and departmental teaching climate are significant predictors of teaching self-efficacy.

Preparing Biology Graduate Teaching Assistants for Their Roles as Instructors: An Assessment of Institutional Approaches

Elisabeth E. Schussler, Quentin Read, Gili Marbach-Ad, Kristen Miller, and Miriam Ferzli

Faculty and staff were surveyed to assess the professional development (PD) for teaching provided to biology graduate students at academic institutions. Although more than 90% of institutions provided PD, it was most often presemester and less than 10 h. Respondents most satisfied with their PD had programs with greater breadth and institutional support.

On the Cover

Students at the University of Amsterdam used a clicker system as part of a flipped class taught by Dr. Van Vliet. Students watched videos and prepared conceptual questions before class. They submitted these questions via a discussion forum, and used these questions for peer instruction during class. Students in this small study (see the article “Flipped-Class Pedagogy Enhances Student Metacognition and Collaborative-Learning Strategies in Higher Education But Effect Does Not Persist”) shifted in their motivations and learning strategies, but the effects were not persistent. Photos courtesy of Thomas Jongstra.