Improving student learning through understanding reasoning and problem solving practices

Jenny Knight
CU Boulder
Friday September 27, 2019 at 1pm in MZ 204

ABSTRACT: Classroom practices affect student behavior, and by extension, their learning. Through studying how students discuss clicker questions in active learning classrooms, we have found that students rarely use reasoning when answering in-class questions. However, their use of reasoning increases when they are cued to use reasoning by their instructors, by peer Learning Assistants, or when under pressure of accountability. Can students transfer in-class group practices to individual assessment opportunities that require reasoning and logic? To answer this, we are studying how students independently solve complex genetics problems through written documentation of their problem-solving processes. We analyze their answers for correctness, use of reasoning, and other cognitive and metacognitive processes. We have also collected data on whether giving students content “hints” or modeling of problem-solving processes improves their ability to solve similar problems, or changes their problem-solving. Ideally, this work will lead to an understanding of how to better help students become life-long problem-solvers.

BIO: Dr. Jenny Knight is an Associate Professor in the Molecular Cellular and Developmental Biology at the University of Colorado, Boulder (CU). She has a Ph.D. in Neuroscience from the University of Michigan, where she studied eye development, and postdoctoral training at CU, where she worked on the genetic control of early cell movements in development. She has been teaching undergraduates at all levels for twenty years and is currently the president of the Society for the Advancement of Biology Education Research (SABER). Dr. Knight's research has focused on developing concept assessments for student learning in biology, studying the impact of in-class work on student learning, and developing and measuring the impact of curricular changes and teacher training on both students and faculty. She and colleagues have developed three concept assessments: the Genetics Concept Assessment (GCA) the Introductory Molecular Biology Assessment (IMCA), and the Molecular Biology Capstone Assessment, all designed to diagnose student misunderstandings and measure learning gains in typical undergraduate biology courses. She and colleagues have also developed an attitudes towards biology assessment (Bio-CLASS), and a taxonomy for measuring Scientific Teaching. Her work is now focusing on understanding how students engage in complex problem solving and scientific reasoning, particularly in genetics.