SPECIAL SEMINAR

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3:30 PM in 1315 Chem

Characteristics, Classrooms and Curricula:
Three Targets to Aim for in Chemistry Education

Chemistry Education Research is concerned with a seemingly simple notion: the teaching and learning of Chemistry. Despite this, CER's methods and lines of inquiry are richly diverse, as are the educational dimensions over which researchers aim these efforts. For example, one could focus on how students interact with a single chemical representation, while others could evaluate the student learning outcomes of an entire undergraduate Chemistry program. This presentation will focus on work aimed at three levels of increasing scope: individual *characteristics* of chemistry students, chemistry *classroom* norms, and General Chemistry *curricula*. First, we focus on individual differences in student language comprehension ability. After all, the words we use, as well as the texts we write and read, form the basis of how we comprehend information and how we construct and co-construct meaning of that information. We demonstrate that language comprehension ability correlates moderately and report the design, implementation and evaluation of a multiple-testing intervention strategy that differentially aids those General Chemistry students of low comprehension ability. Second, we focus on altering classroom assessment norms to support students plagued by illusions of competence. Adopting a "feed forward" strategy (i.e., adjusting classroom norms to reward students for meaningfully engaging in assessment (feedback) appears to not only help students become more calibrated to their performance, but also improve performance on subsequent exams. Third, we focus on a nationwide effort in partnership with the American Chemical Society to reform General Chemistry curricula. There is compelling evidence that engaging students with core disciplinary ideas in ways that practicing chemists do should lead to deeper learning. The goal of this work is to develop a community-based approach to embed these strategies, vis-à-vis the creation of performance expectations, into General Chemistry assessment, learning, and teaching practices. Performance expectations describe what a learner should be able to do and emerge from combining chemistry core ideas, chemistry/science practices, and cross-cutting concepts or reasoning models. This alignment process is informed by *A Framework for K-12 Science Education* and the three-dimensional learning approach, a post-secondary adaption of the *Framework*. Here, we describe the nucleation of a community of practice around this effort, as well as the adoption of Design Based Implementation Research principles to generate a community consensus structure for creating three-dimensional General Chemistry class activities and performance expectations.