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A Case for Foregrounding Epistemology in College Chemistry

ABSTRACT:
There is a long tradition in chemistry education scholarship (including our work) of assuming there is inherent value in students mimicking the practices of professional scientists. For example, one might claim that student groups who construct more "expert-like" explanations or models for phenomena are being better prepared for post-school life than students whose knowledge products align less-well with canon. We will present several recent studies that demonstrate we (as a community) know how to prepare students to construct explanations, models etc. that look like what a scientist might draw or write. If we coherently emphasize and reward the use of big ideas (e.g., energy, bonding interactions) to explain/model phenomena, students tend to bet better able to do these sorts of things. However, our field has almost entirely ignored *why* students are explaining, modeling etc. This is problematic due to evidence that, for students to see ways of knowing and doing emphasized in-class as useful in-life, they must (tacitly) see school tasks as contiguous with life tasks. I will present some evidence that, even in a class that emphasizes mimicking scientific practice, the goals guiding students' knowledge construction work are unlikely to be useful beyond the classroom. I will then argue that a wholesale overhaul of curricula and assessments is likely needed if we truly want students to (potentially) use chemistry knowledge as they are navigating life.

BIO:
Ryan Stowe is an assistant professor of chemistry at the University of Wisconsin – Madison. Ryan earned his Ph.D. from the Scripps Research Institute (TSRI) under the guidance of Prof. William Roush. While enrolled in graduate school, Ryan was appointed a Christine Mirzayan Science and Technology Policy Fellow with the Board on Science Education at the National Academy of Sciences.

As a post-doctoral researcher mentored by Prof. Melanie Cooper at Michigan State University, Ryan worked on several projects related to teaching and learning in chemistry. He led a team of teachers and researchers in designing, assessing, and refining curricular materials for a high school chemistry curriculum aligned with nationally deployed science standards. Additionally, Ryan conducted several studies examining student use-of-knowledge in the context of organic chemistry coursework.

The Stowe Group at UW-Madison focuses on understanding how chemistry learning environments might equip students to use knowledge of atoms and molecules in post-school daily life. Advancing this aim requires the group attend to – and work to develop – students' understandings of knowing and learning science (i.e., epistemologies). If we intend ways of knowing and doing seeded in the classroom to be used in real life, we need to work toward fostering epistemologies that learners see as productive in-class and in life. Ongoing projects in the group focus on understanding how learning environments communicate what and whose knowledge counts, modeling epistemologies that underlie instructors' curriculum and assessment decisions, and fostering research-practice partnerships centered on refining enactment of epistemological goals.