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Do We Ask Students to Do What We Want Them to Learn? An Investigation of the General Chemistry Laboratory Course

ABSTRACT: Contemporary research efforts have illustrated that faculty perspectives should align with learning objectives and assessment of student learning. In the laboratory, students should be asked to demonstrate engagement in scientific practices as aligned with agreed upon goals of what it means to 'do science'. Although existing research has elucidated faculty goals for laboratory courses and discussed assessment of student learning separately, the coherence of faculty goals with formal course learning objectives and student assessment has not been examined. Building on previous literature, we characterized individual instructor goals and student assessment in the context of formally stated learning objectives to investigate alignment between these three elements. Our work demonstrated that instructor learning goals largely overlapped with course learning objectives, and most learning objectives were assessed in some capacity. However, our results indicated that learning objectives were infrequently assessed in ways that may elicit student engagement in scientific practices despite most instructors' beliefs that students should be able to engage in scientific practices by the end of the general chemistry course series. This analysis of the degree of alignment between learning objectives and assessments provides a framework for investigating the coherence of laboratory curricula, which is an essential first step to guide improvements in laboratory learning and teaching.

BIO: Erin M. Duffy is an assistant professor in the Department of Chemistry and in the Science, Math, and Technology Education (SMATE) program at Western Washington University in Bellingham, WA. Her research efforts are concentrated in three areas: (1) student engagement in scientific practices in laboratory courses, (2) conceptual learning in physical chemistry, and (3) preservice teachers' engagement with and understanding of 3-Dimensional Learning in science education. Prior to her career at Western, Erin attained a B.S. in chemistry from Syracuse University in 2012, earned a PhD in chemistry under the guidance of Etienne Garand at the University of Wisconsin-Madison in 2017, and spent two years as postdoctoral scholar in chemistry education research with Melanie Cooper at Michigan State University