

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Applying the results of education research to help students learn more RACHEL E. PEPPER, STEPHANIE CHASTEEN, MICHAEL DUBSON, KATHERINE PERKINS, STEVEN POLLOCK, University of Colorado at Boulder — Over the past 5 years, the physics faculty at the University of Colorado have worked to transform three core courses in our upper-division undergraduate physics curriculum: Classical Mechanics/Math Methods, Electricity and Magnetism and Quantum Mechanics. We discuss our transformations as a potential model for transformation of other upper-division courses, such as fluid mechanics. The goal of our transformations was to improve student learning and to develop materials and approaches that other faculty could adopt or adapt. This work began with faculty in the department meeting regularly to define explicit course learning goals, which then served as a foundation for the subsequent course transformations. The development of the curriculum was also guided by the results of observations, interviews, and analysis of student work. We applied the principles of active engagement and learning theory to transform many elements of the course. Reforms included “clicker” questions, tutorials, modified homeworks, and more. In this talk, we will outline the process, the reforms, and present evidence of the effectiveness of these reforms relative to traditional courses. Some research-based fluid mechanics instructional materials will also be discussed. Our curriculum materials are available at <http://www.colorado.edu/sei/departments/physics.htm>.

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Date submitted: 04 Aug 2011

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