Problem/Project-Based Learning in Upper Division Physics Courses: New Pedagogies and Student Learning and Epistemologies

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Abstract. Project/Problem-based learning (PBL) is an active area of research within the physics education research (PER) community, however, work done to date has focused on introductory courses. This proposal seeks funding to analyze the effectiveness of a course revision in which upper division quantum mechanics, a junior/senior level course at Creighton, was taught using PBL pedagogy with no in-class lectures. The main focus of this work is two-fold: 1. to examine student learning in light of the new pedagogy and to determine if in-class assessments and post-course surveys, interviews, and focus groups can link the PBL methodology to student learning gains in a rigorous way, and 2. to examine the effect of the PBL curriculum on student attitudes towards learning physics and students' epistemologies. This work builds upon previously published work and is aligned with the desire of both the physics department and the college and university for experimentation with and the implementation of new, active forms of instruction.

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