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# Physical Manipulatives in the Introductory Studio Physics classroom: a pilot study

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# Abstract:

The implementation of active-learning pedagogies responds to the call by the American Association for the Advancement of Science for reform of the introductory physics course for pre-health students. Physics education research illustrates the benefits of using physical manipulatives in terms of content learning and skill development. However, reports on the use of manipulatives in a studio-physics setting for pre-health undergraduates are scarce. Our project aims at piloting the adoption of a manipulative (iOLab device) in the physics classroom. The lesson plans follow powerful teaching techniques (derived from cognitive science), standards-based assessment, and universal design for learning. Our project demonstrates an increase in the percent of students who reach proficiency in learning outcomes in the first (out of two) introductory physics courses. In addition, the classroom atmosphere is perceived as industrious, collaborative, and engaging. The core of this proposal is to develop the set of lesson plans and worksheets for the second course in the sequence of introductory physics courses for pre-health undergraduates. We will deliver a set of standalone worksheets that other physics instructors at Creighton may adopt.