Abstract Submitted
for the 4CF15 Meeting of
The American Physical Society

Adapting Interactive Technology to High School Physics Learners with a Novel Framework for Differentiating Classroom Interventions

BRYAN HENDERSON, Arizona State University — The use of clicker voting technology to promote student interaction is increasingly popular in college physics classrooms. However, concerns persist about the efficacy of this technique for younger physics learners. To systematically investigate these concerns, the same instructor taught four different physics classes in four different ways for each of two years at a diverse high school. This permitted differing implementations of clicker use for adolescent physics learners (n=250) to be adjudicated empirically. After controlling for the instructor, multiple student covariates, and the time of day that experimental treatments were implemented, students given an opportunity to discuss their clicker votes verbally with each other significantly outperformed students that instead received a supplemental lecture between clicker votes. This empirical study was predicated on a theoretical framework garnering a surge of attention in the learning sciences, and a practical extension of this research is a non-profit partnership between teachers and researchers. This non-profit utilizes a cloud-based platform to host formative assessment items based on common physics preconceptions. The platform will be demonstrated, including examples of assessments that have been iteratively refined through the use of the system in pilot classrooms. Interested physics educators will be provided access to materials designed to assist effective implementation of the interactive technology in their own classrooms.

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Date submitted: 11 Sep 2015 Electronic form version 1.4