

## **PRIMETIME LEARNING—COLLABORATIVE AND INTERACTIVE PHYSICS TEACHING**

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We developed and studied a radical new approach to teach physics on regular courses. The approach was practical but contained no lectures, no recitation classes, and no end-of-course exams. Instead, the teaching was founded on computer-supported collaborative problem solving [1] in groups of five, using a weekly repeating learning process consisting of four-stages: Principles (self-studying of a new topic using videos and textbook), Practice (small group going through an on-line practice set at their own leisure), Problems (the usual full-scale problem solving assignments), and Primetime (teacher meets privately with one group to reflect upon the problems and to discuss problems arisen during the earlier stages). The learning process was supported by formative assessment (points collected during the course) complemented by self-, peer-, and teacher assessments at the end of the course.

The approach was a carefully designed attempt to modernize teaching traditions and to establish teaching routines that would make better use the known advantages of the formative assessment [2], joint knowledge construction between peers supported by a technology-enhanced learning environment [3], technology enhancement [1, 3, 4] and strong personal interactions among the students and between students and the teacher [5].

The approach was adopted on a second-year thermodynamics and optics course at the Department of Physics, University of Jyväskylä during the fall 2016. The course was monitored by pre- and post-tests on thermodynamics concepts, video recordings of group- and primetime meetings, teacher observations, analysis of learning management system data, and continuous student feedback along with an end-of-course questionnaire. The analysis showed that students had solid learning outcomes, lively engagement during meetings, strong long-term commitment, and positive attitude for the approach. The formative assessment proved functional and reliable. Most important, the approach promoted social integration and overall student well-being.

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