

Technology-Enabled Active Learning: Learning in More than One Dimension

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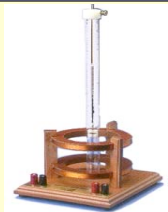


For the past six years, MIT has been offering Introductory Physics in a technology-enabled classroom environment which promotes active learning. Technology-Enabled Active Learning (TEAL) merges lecture, recitations, and hands-on laboratory experience into a technologically and collaboratively rich experience for freshmen, with media-rich interactive software for simulation and visualization. Students gather in groups of nine, with twelve or so such groups in a common area, for five hours per week. This poster introduces faculty to the various components of the TEAL environment. Our goal is to facilitate the adoption of TEAL components into classrooms on other campuses.



ACTIVE LEARNING:

Collaborative learning--students work in groups of 3, with 9 students sitting at a round table, discussing electromagnetic phenomena. Up to 12 tables or 108 students per class. One classroom supports eight sections of 108 students, or a total course population of ~700. Networked laptops, one for each group of 3, with data acquisition links to desktop experiments that students perform and analyze. Media-rich software for multimedia visualization, delivered via class laptops and the Web. Extensive concept questions and course notes with links to the visualizations, available on the web at <http://web.mit.edu/8.02t/www/>



Assessment and Evaluation Results

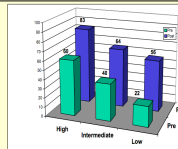
Results of standard conceptual tests shows TEAL learning gains (g) a factor of 2 higher than traditional instruction.

$$g = \frac{\%Correct_{post-test} - \%Correct_{pre-test}}{100 - \%Correct_{pre-test}}$$

(Handouts of summative assessment available).

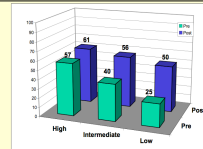
TEAL instruction learning gains

$\langle g \rangle = 52\%$
(N = 176)



Traditional instruction learning gains

$\langle g \rangle = 27\%$
(N = 121)



Visualization and Simulations:

We are currently developing and assessing of a full suite of visualizations in electromagnetism, embedded in a pedagogical framework for their delivery which is designed to optimize student learning. Many of the visualizations are virtual versions of experiments done in class and available as video files. A large number of these visualizations are already available at

http://web.mit.edu/8.02t/802TEAL3D/teal_tour.htm

More visualizations and associated curricular material will be available at the Summer 2008 American Association of Physics Teachers Meeting in Edmonton, Canada.

