Engaging Students in Class and Virtually with Interactive Lecture Demonstrations (ILDs)

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Abstract. The results of physics education research and the availability of computer-based tools have led to the development of research validated active learning strategies that have been demonstrated to enhance learning in the introductory physics course. One reason for the success of these materials is that they engage students to take an active role in their learning. This workshop will demonstrate Interactive Lecture Demonstrations (ILDs) through active participation. The workshop will include work with a virtual version—Home-Adapted ILDs—to be used in distance learning situations. ILDs have been demonstrated to substantially improve conceptual learning.

Introduction

There is ample physics education research (PER) evidence to demonstrate that the majority of introductory physics students do not understand basic physics concepts after being taught using traditional lecture and laboratory strategies. Active learning strategies--many making use of computer-based tools to help students with their observations of the physical world--have been demonstrated to be much more effective. [1] After successfully applying these principles to the development of *RealTime Physics* active learning laboratories, the author (along with colleague Ronald Thornton) developed an active learning strategy for the lecture portion of the course called *Interactive Lecture Demonstrations (ILDs).* [2,3]

Interactive Lecture Demonstrations (ILDs)

Interactive Lecture Demonstrations are a strategy to make lectures more active learning environments. They use an 8-step process involving predictions about a physics demonstration, small and large group discussions, carrying out the demonstration and observing the result, student discussions of the result and of analogous phenomena or applications. The strategy engages the students and gets them to examine the physical world in a critical way. Participants in this workshop will actively experience examples of ILDs in a number of different physics topic areas. They will receive a link to download an electronic version of the book *Interactive Lecture Demonstrations* that contains the classroom materials for 28 sets of ILDs. [3]

Home-Adapted ILDs

Inspired by the needs thrust upon us by the pandemic, I adapted *Interactive Lecture Demonstrations (ILDs)* for home use, using the wealth of multimedia materials currently available (videos, simulations, photos, computer-based laboratory graphs, etc.) for student observations. [4] While recognizing that small-group discussions--and sharing in any way--may be difficult for many faculty to implement, these *Home-Adapted ILDs* retain predictions as an essential element in engaging students in the learning process. Participants will have the opportunity to work with examples from the 26 sequences of *Home-Adapted ILDs* that are available to use online, free of charge, in most areas of introductory physics.

References

[1] D. R. Sokoloff, R. K. Thornton, P. W. Laws, RealTime Physics: Active Learning Labs Transforming the Introductory Laboratory, *Eur. J. of Phys.* **28** (2007) S83-S94.

[2] D. R. Sokoloff and R. K. Thornton, Using Interactive Lecture Demonstrations to Create an Active Learning Environment, *Phys. Teach.* **35**(6) (1997) 340.

[3] D. R. Sokoloff and R. K. Thornton, *Interactive Lecture Demonstrations*, Wiley, Hoboken, NJ, 2004.

[4] See https://pages.uoregon.edu/sokoloff/HomeAdaptedILDs.html