

## **Instructional Strategies for Introductory Physics (ISIP) Workshop** **April 11 – 13, 2013 – Fox Valley Technical College, Appleton, WI**

Workshop Leaders:

Anne Cox, Eckerd College, St. Petersburg, FL  
David Weaver, Chandler-Gilbert Community College, Mesa, AZ  
Bradley Staats, Fox Valley Technical College, Appleton, WI  
Dwain Desbien, Estrella Mountain Community College, Avondale, AZ  
Tom O’Kuma, Lee College, Baytown, TX

Physics students enter our classrooms with important skills and knowledge (along with a few alternative conceptions). Furthermore, they also bring expectations about the ways they will (or won't) use physics in their careers or in other aspects of their life outside the classroom. There are many highly laudable efforts that have been made to address the impedance mismatch between students' background as well as the needed exit knowledge and skills for physics courses. We believe a problem-based learning (PBL) format is another effective tool in this mission. This workshop is designed for teachers who are interested in using and developing new authentic learning tasks in introductory physics.

"How can I get my students to think?" is a question asked by many faculty, regardless of their disciplines. Problem-based learning (PBL) is an instructional method that challenges students to "learn to learn," working cooperatively in groups to seek solutions to real world problems. These problems are used to engage students' curiosity and initiate learning the subject matter. PBL prepares students to think critically and analytically, and to find and use appropriate learning resources (by Barbara Duch on website: <http://www.udel.edu/pbl/>.)

This workshop will feature the use of one form of PBL, Very Large Contexts (VLC), in which student teams have 4-5 weeks to construct a project, collect pertinent data, create a technical instruction manual for their device and develop a multimedia presentation about their efforts. Participants will work in small groups on specific VLCs projects.

Computer simulations, for example, can provide an interactive and conceptual mode for student understanding. Simulations alone, however, are not necessarily the answer for increasing student understanding. They must be informed by good pedagogical practices and must be adaptable to a variety of educational environments. Thus, this STIP workshop will allow participants to explore how these simulations can be used most effectively in the classroom. This often means coupling simulations with various teaching strategies.

During this workshop, participants will become familiar with the variety of simulations available. Participants will work with Physlets<sup>®</sup> (physics applets) and Open Source Physics resources ([www.opensourcephysics.org](http://www.opensourcephysics.org)). Included in this set of resources are tools for authoring simulations (Easy Java Simulations) and video analysis (Tracker). Participants will also become familiar with other simulations, e.g., the PhET simulations (<http://phet.colorado.edu/new/index.php>) which are research-based, interactive physics simulations. Participants will also develop the ability and skills to modify, adapt, and construct new materials. One of the goals of this workshop is to provide a flexible suite of resources appropriate to different levels of instruction as well as different levels of technological sophistication (from low to high) so that participants can choose what will be most successful in their home environment.

The workshop leaders have many years of experience in developing and refining curriculum for introductory physics students. In addition, and more importantly, the workshop leaders have had extensive experience with the implementation and adaptation of curriculum in a variety of institutions and for many types of introductory physics students along with the training of faculty in using and developing their own curricula for their technology-oriented students. This workshop is designed for TYC and HS teachers who are interested in using technology in lab and their courses to improve teaching and learning in introductory physics courses.

There will also be an opportunity to share and discuss issues relating to teaching physics more effectively (particularly for students enrolled in technician/technology education programs), and how to use various strategies, tools, and tactics to overcome problems and barriers to learning at TYCs and HSs. Important issues such as standards, assessment, diversity, and technology utilization will be addressed at various points during the workshop. Discussion and information on the needs of the technological workforce and its connection with the activities of this workshop will also be presented.

The local host will be Bradley Staats who is a chemistry and physics professor at Fox Valley Technical College (FVTC). His college serves approximately 50,000 students annually. Last year, the college, which offers more than 200 associate degrees, technical diplomas and certificate programs, had the highest enrollment of all 16 colleges in the Wisconsin Technical College System.