Simulations Tools for Introductory Physics (STIP) Workshop

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Recent physics education research indicates that the "traditional" lecture-style, passive learning model does not substantially impact the learning and understanding of most students who take introductory physics. The research also indicates that most students enter introductory physics with alternative conceptions to many of the basic concepts that are taught in introductory physics. For most students, passive learning techniques generally do not replace these "misconceptions" with concepts that are more consistent with our understanding of nature. Results from physics education research have identified several different active learning techniques that have substantially increased student conceptual understanding in introductory physics.

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© (physics applets) and Open Source Physics resources (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 Tom O'Kuma who has hosted many workshops in the past and has worked with many TYC and HS physics teachers over the past twenty years.