Active Learning Workshop at August AAPT 2005 Meeting

The 2005 Summer Meeting of the American Association of Physics Teacher was held this year in Salt Lake City, on the University of Utah campus. It brings together high school teacher, university faculty and technical personnel for workshops and sessions to help educators improve their skills in all aspects of physics teaching laboratory / lecture environment.
I attended a full day workshop on Active Learning with RealTime Physics, Interactive Lecture Demonstrations and the Physics Suites lead by David R. Scholoff and Priscilla Laws to learn about some technical aspects of similar hardware and software apparatus used to implement a computer based laboratory program. The co-leaders outlined how the "Activity Based Physics Suites" materials evolved and compared this active learning environment using this curriculum with the traditional (passive teaching methods).
We first completed a Force and Motion Conceptual Evaluation sheet in which participates answered short questions on the upcoming mechanics topics. This enable the class to undertake problem solving discussion prior to doing the hand-on computer lab experiments in which all 12 participates were divided into groups of 3 people each.

The hand-on lab experiments consisted of lab exercises in the Mechanics, Light & Optics, as well as Electric Circuits modules in the Physics Suite curricula material. Activity used the Microprocessor Based Lab tools to obtain and plot real time data results immediately. The set of related activities consisted of prediction, observation, comparison, analysis and experimentation. Group discussion as well as communication with co-instructors was available throughout each session.

The RealTime Physics Mechanic module consisted of 12 labs topics in classical mechanics including Newton's three laws of motion. Our first hands-on labs 1 & 2 (Introduction to Motion and Changing Motion) used the MBL system with a motion sensor to study one-dimensional kinematics. Each group member recorded his \ her own body movement at their workstation and later using a battery operated fan accessory fixed to a low friction dynamic cart we conducted experiments on constant acceleration. These results could be compared to distance, velocity and acceleration-time graphs and their relationship analyzed.

In the Geometrical Optics module, we examined how lens formed images. Using a DC power supply, 2 miniature light bulbs as point sources and a cylindrical lens we followed a series of lab activities with questions and predictions to be answered and subsequently tested.

The RealTime Physics Electric Circuits Module covered basic DC circuits and an introduction to AC circuit. Our hands-on lab1 and 2 focused on connecting and measuring voltage and current flow in a variety of different series and parallel circuits. Here we again used the MBL probes and software to display the various predictions.

The afternoon session was devoted to the Interactive Lecture Demonstration materials which uses an eight step interactive lecture demonstration procedure to teach physics in one topic area. Our group was given an exercise sheet on polarized light which we used to make predictions and gather information. Using the Teacher Presentation Notes accompanying this subject we prepared a 10 minute class presentation. Participates then used active learning techniques to encourage class feedback about the possible results to a short, simple experiment. Following each presentation the co-instructors gave a critiqued of the session with hints on how to provide correct answers and improvements to our teaching technique.

In conclusion, this workshop was quite helpful because we used equipment from both vendors such as the Vernier LoggerPro software and LabPro acquistion probes along with the Pasco low-friction cart system and fan accessory to collect and display realtime data. The ILD book provided a good resource for simple interactive physics demonstration that could be used in most first year lecture presentation. I found the Interactive Lecture Demonstrations sheets for the teacher and student was very useful in integrated the experimental apparatus and theoretical materials together.

Howard Okada
Undergraduate Teaching Services Manager
Physics Department
University of Toronto
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