Past Successes and Future Directions
National Two-Year College Physics Meeting
Saturday July 17th, 2010

8:00 – 8:30 Arrival and Registration

8:30 – 8:45 Welcome
Paul D'Alessandris, Monroe Community College, NY

8:45 – 10:15 Critical Issues in Two-Year Colleges
A. Addressing Isolation with New Technologies
Karim Diff, Santa Fe College, FL

B. The Role of the Two-Year College in Teacher Training
Chitra Solomonson, Green River Community College, WA

10:15 – 10:30 Break

10:30 – 11:30 Mini-Workshops
A. nTIPERS: Research-based Conceptual Reasoning Tasks for Introductory Mechanics
Curt Hieggelke, Joliet Junior College, IL

B. Energy in the 21st Century
Pat Keefe, Clatsop Community College, OR
Greg Mulder, Linn-Benton Community College, OR

11:30 – 12:30 Lunch

12:30 – 2:30 Classroom Issues in Two-Year Colleges
A. Adopting & Adapting PER-based Curriculum
Todd Leif, Cloud County Community College, KS

B. Innovations in the Introductory Laboratory
Dwain Desbien, Estrella Mountain Community College, AZ

2:30 – 2:45 Coffee break

2:45 - 4:45 Sample Classes
Scott Schultz, Delta College, MI
A. Project-based Instruction
David Weaver, Chandler-Gilbert Community College, AZ

BI. Writing about Circuits Conceptually
Mike Faleski, Delta College, MI

BII. Periodic Motion
Jerry O'Connor, San Antonio College, TX

4:45 - 5:00 Final Thoughts and Goodbye
Paul D'Alessandris, Monroe Community College, NY

6:00 Open House at Vernier Software

Critical Issues in Two-Year Colleges

A. Addressing Isolation with New Technologies

Presider: Karim Diff, Santa Fe College, FL karim.diff@sfcollege.edu

According to the 2002 survey conducted by the AIP Statistical Research Center, 86% of two-year college physics programs have two or fewer full-time faculty. One of the consequences of this situation is the feeling of isolation experienced by TYC physics faculty. Over the past twenty years, projects such as the TYC21 Project have attempted to alleviate this problem by developing a network of TYC faculty through regional and national meetings. After some success, the network has progressively faded away, although some traces of it are still present, and isolation remains one of the most significant issues faced by TYC physics faculty today.

During this interactive session we will take a fresh look at this issue. Panelists will first review the lessons learned from past efforts, discuss the current situation, and explore possible solutions with today's interactive web technologies such as wikis, blogs, or social networks. This will be followed by an open-ended discussion during which members of the audience will be invited to provide input and suggestions that will form the basis for a plan of action.

Panelists

Mary Beth Monroe, Southwest Texas Junior College, TX mbmonroe@swtjc.cc.tx.us

Renee Lathrop, Dutchess Community College, NY lathrop@sunydutchess.edu

Paul Williams, Austin Community College, TX pwill@austincc.edu

David Weaver, Chandler-Gilbert Community College, AZ david.weaver@cgcmail.maricopa.edu

Karim Diff, Santa Fe College, FL karim.diff@sfcollege.edu

B. The Role of the TYC in Teacher Training

Presider: Chitra Solomonson, Green River Community College, WA csolomonson@greenriver.edu
A large percentage of prospective K-12 teachers begin their education in two year colleges. With our clear commitment to teaching, and with so many prospective teachers as our students, we play a crucial role in the system of teacher preparation. Successes and failures in both pre-service and in-service teacher training will be spotlighted, as well as the expanded opportunities available through the Physics Teacher Education Coalition (PhysTEC).

Panelists

Asa Bradley, Spokane Valley Community College, WA asab@spokanefalls.edu
Asa works with future elementary teachers at Spokane Valley

Keith Clay, Green River Community College, WA KClay@greenriver.edu
Keith is the founder of Project TEACH at Green River

Bruce Palmquist, Central Washington University, WA palmquis@cwu.edu
Bruce is the director of the junior/senior teacher prep program at Green River

Collette Adams and Jackie Kreselak
Collette and Jackie are Green River graduates and elementary teachers

Ted Hodapp, Director of Education and Diversity, American Physical Society, hodapp@aps.org
Ted is the project Director for PhysTEC

Mini-Workshops

A. nTIPERS: Research-based Conceptual Reasoning Tasks for Introductory Mechanics

Curtis Hieggelke, Joliet Junior College, Joliet, IL 60431, curth@comcast.net

On work done with:
David P. Maloney, Indiana University-Purdue University Fort Wayne, Fort Wayne, IN 46805, maloney@ipfw.edu
Steve Kanim, New Mexico State University, Las Cruces, NM 88003, skanim@nmsu.edu

In this mini-workshop, participants will explore some new materials designed to help students think about fundamental concepts in alternative and multiple ways. These are designed to promote robust learning and understanding of physics in mechanics. Participants will work with a variety of tasks and task formats that require students to think about the basic physics in the domains of kinematics and dynamics, including rotational dynamics and oscillations, in nonstandard ways. The exercises in these formats are based, in part, on efforts in Physics Education Research and thus are called TIPERs (Tasks Inspired by Physics Education Research). Such tasks support active learning approaches and can be easily incorporated into instruction in small pieces. TIPERs focus on making connections between the mathematical formalism of introductory physics and the underlying physics concepts, and are intended to help students make sense of the equations they are using rather than just using these equations algorithmically.

This work is supported in part by grants #0632963 and 0633010 from the Division of Undergraduate Education of the National Science Foundation

B. Energy in the 21st Century

Pat Keefe, Clatsop Community College, 1653 Jerome Ave, Astoria, OR 97103, pkeefe@clatsopcc.edu
Greg Mulder, Linn-Benton Community College, 6500 Pacific Blvd, Albany, OR 97321, mulderg@linnbenton.edu

We have found that engaging students in predictions of what form and how much energy will be used in the future is a very successful way to generate enthusiasm and further investigation of physics. Participants of this workshop will be introduced by way of experience to two different group projects that involve designing energy systems. These modeling exercises look at past energy consumption patterns and develop a plan for energy usage in the 21st Century. Other considerations such as population, costs and efficiencies are also used to further expand the discussion and decision making that takes place.

Classroom Issues in Two-Year Colleges

A. Adopting & Adapting PER-based Curriculum

Presider: Todd Leif, Cloud County Community College Concordia, KS 6690, tleif@cloud.edu

Physics Education Research (PER) is now well into its third decade of activities and its findings have become accepted practice for physics education. PER's research outcomes (curriculum models) are being implemented across the nation in Two-Year Colleges (TYC's). TYCs are the perfect testing ground for curricular innovations such as those developed by PER due to our smaller class sizes and rich tradition of teaching physics, rather than a tradition of research in physics. This session will begin with a brief overview of some sample innovative programs that are a result of instructional models based on results of physics education research. After the overview of some of these programs, a series of experienced adapters will guide you through the process of molding PER-based curriculum to fit into your classroom.

I. Peer Instruction and the Use of Clickers in the TYC Classroom

Michael C. Faleski, 1961 Delta Rd, Delta College, University Center, MI 48710, michaelfaleski@delta.edu

Peer Instruction and the use of Clickers in the Classroom is one of the major innovations that was brought to light during the Physics Education instructional revolution. Clickers, which I first introduced into all of my classes in the Fall of 2006, have become a staple of many class activities. Based on results from standard assessment exams (FCI, CSEM, DIRECT) and from student feedback about the devices, there will be continued use of this technology for the foreseeable future. In this presentation, there will discussion of how the clickers were implemented into the classes and what was gained/lost in the standard curricula in order to accommodate their usage. Results from the assessment exams from both the calculus-based students and the trig-based students will be discussed. In addition, there will be both a description and examples of some of the various questioning techniques for which clickers are used in my classes.

II. ILD's MBL, Workshop Physics, and Managing an Interactive Physics Classroom

Another major movement in PER was the use of microcomputer-based activities in both the physics lecture and laboratory classrooms. In addition to the introduction of these activities into the lab setting a number of Workshop-style teaching environments have developed and are used as a classroom management style.

Traditional Lecture to Activity-Based Instruction: One Instructor's Journey

John Griffith, Red Mountain Campus, Mesa Community College, 7110 E McKellips Rd, Mesa, AZ 85207, john.griffith@mesacc.edu

Early in my career, I primarily taught classes of 72 students in a traditional, lecture style format. More recently, I have moved to designing curriculum for integrated, activity-based classes with up to 24 students. In this session, I will briefly discuss this transition and then have participants go through a few different activities from my algebra-trig based physics course using Modeling Discourse Management and Clicker questions. Some time will be spent discussing the process I use to come up with activities.

Blurring the Lines: Integrating PER-based activities into instruction.

Robert Hobbs, Science Division L200, Bellevue College , Bellevue, WA 98007, rhobbs@bellevuecollege.edu

The TYC classroom offers unique opportunities to implement PER based pedagogies and strategies. This workshop will begin with straight forward examples of Interactive Lecture Demonstrations (ILD) and Microcomputer Based Laboratories (MBL). These are then blended and extended. Examples of demonstrations that use computers, demonstrations that become guided inquiry for part or all of the class period, and demonstrations with clicker stimulated discussion will be presented. Similarly, traditional use of real time data collection integrated with demonstrations and incorporated in guided inquiry will be discussed, followed by extensions that utilize additional computing or simulation capabilities. Examples include simulating concepts or environments not easily created in the lab, rapidly analyzing or presenting data in uniquely accessible forms, and capturing phenomena not easily observed by our senses. It is hoped that a collective discussion of appropriate choices and criteria for various methods will naturally occur during the presentation.

B. Innovations in the Introductory Laboratory

Presider: Dwain Desbien, Estrella Mountain Community College, Avondale, AZ 85323
dwain.desbien@estrellamountain.edu

The first half of this session will be a tutorial on using video analysis. The second half will be an interactive panel discussion on issues related to traditional labs, MBL, online labs and more.

I. Video Analysis with LoggerPro

Scott Schultz, Delta College, 1961 Delta Rd, University Center, MI 48710, sfschult@delta.edu

Many of us already use LoggerPro® from Vernier Software to collect and graph data during microcomputer based laboratory experiments. LoggerPro also allows users to conduct video analysis of short clips, either in conjunction with taking MBL data or separate. During this session we will explore some of the possibilities that video analysis offers. This will include the analysis of already made clips, making your own clips and collecting in conjunction with taking MBL data. We will even look at shooting at a high rate of speed to capture events that occur in a very short time span. To keep costs down for the meeting, computers will not be provided. Participants that have the ability should bring a computer with LoggerPro installed to work through the activities.

II. Panel Discussion

Thomas L. O'Kuma, Mathematics, Engineering, and Science Division, Lee College, P. O. Box 818, Baytown, TX 77522, tokuma@lee.edu

David Weaver, Chandler-Gilbert Community College, Williams Campus, 7360 E. Tahoe Ave., Mesa AZ 8521, david.weaver@cgcmail.maricopa.edu

Dwain Desbien, Estrella Mountain Community College, Avondale, AZ 85323, dwain.desbien@estrellamountain.edu

Sample Classes

Presider: Scott Schultz, Delta College, 1961 Delta Rd, University Center, MI 48710, sfschult@delta.edu

How many times have you ever been at an AAPT meeting listening to a cool talk from one of our Two-Year Colleagues discussing an activity or approach they take in teaching a topic and wish you could sit in and watch them teach back at their home institution? This is an attempt to bring their classroom to the AAPT meeting. Presenters will be given an extended period of time to share with you an activity they use in their classroom. You will see them in action as they try to replicate what they do in front of you. There are parallel sessions to choose from. Session A will showcase David Weaver for the full two hours. Session B will have Mike Faleski share one lesson the first hour and Jerry O'Conner during the second hour.

A. Project-based Instruction

David Weaver, Chandler-Gilbert Community College, Williams Campus, 7360 E. Tahoe Ave., Mesa AZ 85212, david.weaver@cgcmail.maricopa.edu

BI. Writing about Circuits Conceptually

Michael C. Faleski, Delta College, 1961 Delta Rd., University Center, MI 48710, michaelfaleski@delta.edu

Physics education research has shown that students have many misconceptions about simple circuits[1,2,3]. The "Essay Lab" (so-named by former students) is an activity designed to probe student understanding of circuits by having them discuss a set of multiple choice questions, construct the circuits in the lab and record data, discuss the questions again in their lab groups, and finally write essays about the physics of the circuits. In the essays, students are to explain for each question not only why one of the answers is correct, but also why the other choices are incorrect. These explanations are to make no direct reference to the data collected, but rather they are to use physical ideas and conclusions based on qualitative reasoning. In this session, participants will have the opportunity to participate in the classroom portion of the activity. The workshop will conclude with a discussion both of some common errors made by students in writing their essays for the reports and also of the results from assessment devices from students in my classes.

1. R. Cohen, B. Eylon, and U. Ganiel, "Potential difference and current in simple electric circuits: A study of students' concepts," Am. J. Phys **51** (5), 407-412 (1983).
2. Beth Ann Thacker, Uri Ganiel, and Donald Boys, "Macroscopic phenomena and microscopic processes: Student understanding of transients in direct current electric circuits," Am. J. Phys. Suppl. **67**(7), S25-S31 (1999).
3. Paula Vetter Engelhardt and Robert J. Beichner, "Students' understanding of direct current resistive electric circuits," Am. J. Phys. **72**(1), 98-115 (2004).

BII. Periodic Motion

Jerry O'Connor, San Antonio College, 1300 San Pedro Avenue, San Antonio, TX 78212, joconnor@alamo.edu