



Buffalo State

American Physical Society and American Association of Physics Teachers: Joint New York State Section Meetings and Spring 2004 Symposium

April 16-17, 2004: Buffalo State College

What Physics Education Research says to Physicists & Physics Educators

Maps, Registration and details: <<http://www.buffalostate.edu/depts/physics/symposium04/>>

Friday 16Apr04:

9:00-12:00 APS Executive Business meeting (Campus House- Bldg #5);

12:00-1:00pm On-site registration (Bulger Communications Bldg #24)

1:00pm-1:20pm Opening and Welcome (President Muriel Howard)

Friday, 16 April, 2004, 1:20pm-4:25pm, Session I: Recruiting and Retaining Underrepresented Populations Buffalo State Bulger Communications Bldg #24 (4 x 40min presentations + 20min break)



How we can help: The Rutgers Story

Dr. Eugenia Etkina, Graduate School of Education, Rutgers University

This talk focuses on the efforts of Rutgers Department of Physics and Astronomy to increase the retention of underrepresented students in introductory physics courses. In order to provide a physics instructional environment in which underrepresented students (particularly women and minorities) can successfully learn and enjoy introductory physics, Extended Analytical Physics as an option for engineering majors and Extended General Physics as an option for science, science teaching and pre-health professions majors were created at Rutgers University. The courses have been taught for the last 10 years. Students enrolled in these courses have significantly lower Math SAT scores and physics

placement scores but at the end achieve the levels of conceptual understanding and problem solving similar to that of the main stream students. Engineering students are able later to succeed in a traditional second-year course and remain in the engineering program. This presentation will focus on the essential elements of both courses that make such success possible. A special emphasis will be on the course for engineering students.

Can Corporate America help? How Xerox does it with *The Xerox Science Consultant Program*

Ewart O LeBlanc M.S., Manager, Xerox Corporation



Nested in the core values of most companies is the idea of exhibiting behaviors that support an inclusive work environment as measured by a well-balanced workforce. It is therefore not surprising that both academia and industry place a premium on recruitment and retention of scholars from underrepresented populations in areas related to physics and physics based disciplines. There is a sense that more can be done to attract students to physics, long before the college application or the job interview. The Xerox Science Consultant Program (XSCP), endorsed by the Senior Management at Xerox, is a community education outreach program established in 1968. The XSCP is a hands on program designed to stimulate interest in science, math and technology at the elementary school level. This presentation will share the inner workings of the program, how it has developed over the years and how it has touched the lives of over 80,000 children in the past 35 years.



Hints from the *Physics Enrollment Pipeline* for Recruiting and Retaining Under-represented Students

Dr. Michael Neuschatz, American Institute of Physics

The Statistical Research Center at the American Institute of Physics regularly collects data on the number and composition of physics students from high school to grad school. We will look at the historical trends in the representation of minority students, compare that representation at different academic levels, and consider the implications for efforts to expand minority presence in physics departments across the country. AIP Statistical reports and published articles regarding the

physics pipeline are available from: <<http://www.aip.org/statistics/>>

Early Career Rotational Programs Help Kodak Build and Maintain a Truly Diverse Corporation

Dr. John Lacey, Kodak Corporation

Kodak's Image Science Career Development Program is an early career rotational program that serves as a great transition for recently graduated engineers and scientists from an academic to industrial environment. The recruitment and hiring process associated with the ISCD Program is in line with our Corporate Global Performance Expectation on "Building and Managing a Truly Diverse Corporation," which fosters:

1. building a workforce that more closely reflects the markets we serve;
2. managing a workplace environment that encourages different perspectives and challenges, supports and recognizes people for their contributions; and
3. evaluating managers on their ability to hire, retain and encourage the growth of diverse employees



5:00-6:45pm poster session (Buffalo Historical Society, 25 Nottingham Ct. near campus)

5:30-7:00pm cash bar and 6:45-7:45pm banquet (Buffalo Historical Society, 25 Nottingham Ct. near campus)

SYMPOSIUM KEYNOTE SPEAKER and FREE PUBLIC LECTURE

8:00-9:00pm, Friday 16 April 2004 Buffalo Historical Society, 25 Nottingham Ct. near campus



Assessment and Achievement: True Confessions of a Reformed Practitioner

Dr. Michael Zeilik, Dept of Physics & Astronomy, University of New Mexico

By the end of the 20th century, robust research has proved that today's introductory physics and astronomy classes FAIL for most students most of the time. We are losing talented people from physics who often leave after running the gauntlet of disastrous learning environments. A full century of science education research and some twenty-five years of physics and astronomy education research (PAER) contains answers, focusing on peer interactions and classroom assessment.

Professor Zeilik received both the American Association of Physics Teachers' 2003 *Excellence in Introductory College Physics Teaching Award*, and the American Astronomical Society's 2002 *Education Prize*. Some of his work is at <http://www.flaguide.org/>.

Free parking is available. Refreshments will be served, and attendance letters for teacher professional development or AAPT Continuing Education Unit (CEU) credit are available. *Courtesy of J.S. Wiley & Sons, the first 300 attendees will receive a complimentary copy of Teaching Physics with the Physics Suite by E.F. Redish, valued at approximately \$30.*

Saturday, April 17, 2004 7:00-8:00am AAPT Executive Committee Meeting (Caudell Hall Bldg #18)

Saturday, 17 April 2004, 9:00am-noon, Session II: Research on Learning Physics, Buffalo State Bulger Communications Bldg #24 (4 x 40min presentations + 20min break)

Is understanding really the point of physics teaching?

Dr. Dewey Dykstra, Physics Department, Boise State University

Many, if not most, who teach physics could be expected to answer this question in the affirmative. Both formal observation of student understanding by members of the physics education research (PER) community and informal observation of student understanding in physics reveal that change in understanding of the phenomena is not the outcome of physics teaching as it is today. An explanation for this outcome and its incongruence with a declared goal of physics teaching will be suggested. Data on student understanding from research in physics teaching will be presented to illustrate an alternative to physics teaching, as it is today, in which development of new understanding of phenomena is a routine result.



Uncommon Knowledge: Student Behavior Correlated to Conceptual Learning

Dr. Ronald K Thornton, Center for Science and Mathematics Learning, Physics & Education, Tufts University

For many years we have observed and videotaped students learning force and motion (mechanics) concepts in introductory physics labs that use guided discovery curricula (RealTime Physics) enabled by microcomputer based laboratory (MBL) tools. The students work in groups of three and the MBL software and hardware allow students to measure experimental results and display them in real time. Many previous studies using the Force and Motion Conceptual Evaluation show that most students (75 to 90%) learn force and motion concepts in this environment. By carefully analyzing the behavior of these student trios, we have identified a characteristic set of behaviors for those who learned conceptually, not ones that most teachers predict, and those who did not. We are able to characterize student behavior as they progressively learn a concept. We observe the positive and negative effects that group dynamics can have on individual student conceptual learning. Video examples will be shown and discussed.

Physics Education Research-based reform at a multicultural institution

Dr. Richard Steinberg, Associate Professor of Physics and Education, Physics Department, CCNY



At City College of New York, more than half of the students are from other countries and/or learned English as a second language. Students are native to over 90 countries representing Africa, Asia, Europe, Latin America, as well as all over New York City. Nevertheless, we use PER-based instructional strategies and curricula that require significant interaction. During group work, students are required to explain what they are doing and interpret and respond to others' arguments. During lectures, class is interrupted by difficult conceptual questions where responses and justifications are shared. Despite the premium on language and interpretation of context, we have found that these interactive strategies are successful in our multicultural environment. In this talk I will describe some of the strategies that we use and results on their effectiveness.



Expert/Novice Comparison of Problem Solving Views and Attitudes

Dr. Karen Cummings, Dept of Physics, Southern Connecticut State University

A survey of attitudes towards and views of problem solving is under development. This is part of a larger project to develop an assessment of student problem solving ability. The survey is intended for use in a "MPEX" like format. That is, it is to be given to students pre- and post-instruction and the student responses are evaluated in comparison to the answers typically given by "experts" in solving introductory physics problems. Post-instruction movement of student responses toward those commonly given by the "experts" is considered to be improvement. This survey has already been given to approximately 700 students at Rensselaer Polytechnic Institute both pre- and post-instruction. In addition, it has been given to physics faculty members from a host of institutions and to general science students at Southern Connecticut State University. Survey responses for these groups will be presented and compared.

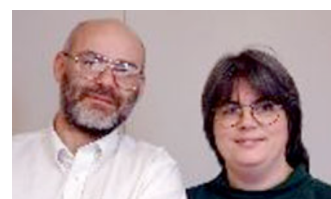
Noon-1:25pm Lunch by own arrangement (nearby restaurants)

Saturday, 17 April 2004, 1:30pm-2:45pm, Session III: Applying Research in the Physics Classroom Buffalo State Bulger Communications Bldg #24 (2 x 40min presentations)

SCALE-UP: Active Learning in Large Classes

Dr. Robert Beichner, Department of Physics, North Carolina State University

The primary goal of the Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) Project is to establish a highly collaborative, hands-on, computer-rich, interactive learning environment for large-enrollment courses. (Of course, smaller classes can also benefit.) Class time is spent on hands-on activities, simulations, or interesting questions and problems. There are also hypothesis-driven labs. Students sit in three teams of three students at round tables. Instructors circulate and engage students in Socratic-like dialogues. Rigorous evaluations of learning have been conducted in parallel with the curriculum development effort. We have seen improved ability to solve problems, increased conceptual understanding, better attitudes, and drastic reduction in failure rate, especially for women and minorities. The SCALE-UP website is <http://www.ncsu.edu/per/scaleup.html>



The Reformed Teaching Observation Protocol (RTOP) in Physics Classes

Dr. Dan Maclsaac, Physics; & Kathleen Falconer M.S., Elem Educ & Reading, SUNY- Buffalo State College

We describe the use of streamed video of physics classroom practice for introducing research-proven "reformed teaching" practices to physics instructors. In this talk we will show a video vignette of student-centered modeling physics learning featuring extraordinary levels of student dialog. We will also provide an overview of the RTOP scoring rubric for assessing the degree to which any physics learning environment meets research-based expectations for promoting student learning. The RTOP website with streamed videos and materials is: <http://physicsed.buffalostate.edu/rtop/>.

2:50pm Closing remarks: Presidents of NYSS-AIP and NYSS-AAPT; Fall04 conference coordinators

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