AAPT Programs & Conferences Tools

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PER: Diverse Investigations II

AAPT | **Type:** Con | **Organizer:** AAPT

Description:

Call for Papers:

Abstracts Submitted (# 10)

Abstract Title: Access to and Awareness of Undergraduate Research Opportunities at a Large Research University

Paper Type: Contributed

Author: Stephanie 5. Hanshaw
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Speaker Order: DI01

The American Physical Society released a 2014 statement calling on all university physics and astronomy departments to provide all undergraduate students with access to research experiences. In response to this call, we investigated the current status of access to undergraduate research at CU-Boulder, a large research institution where the number of undergraduate physics majors outnumber faculty by more than five to one. We created and administered two surveys within CU-Boulder's Physics Department: one probed undergraduate students' familiarity with and participation in research; the other probed faculty members' experiences mentoring undergraduate researchers. We present results from these surveys about access to undergraduate research within CU-Boulder's Physics Department.

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Abstract Title: Assessing the Maryland Learning Assistant Program
Paper Type: Contributed
Author: Chandra Anne Turpen
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Speaker Order: DI04

This presentation gives an overview of findings from the first four years of running a Learning Assistant (LA) program[1] at the University of Maryland, College Park (UMCP). At UMCP, LAs have supported educational transformation efforts across 12 different science courses and engaged 22 different instructors in research-based educational practices. In assessing the impact of this program on LAs, we have replicated CU-Boulder's finding that LAs' conceptual understanding is improved through participation in the LA program (~10% average absolute gain on FMCE[2]) [3]. We are investigating the longitudinal impacts of the LA experience on LAs and how LA programs may be cultivating change agents. We find that many of our former LAs continue to be involved in some teaching and work to change how learning environments are structured. LAs also report that their experiences in the program were transformative for the ways that they thought about teaching and learning science.

Footnotes: [1] V. Otero, N. Finkelstein, R. McCray, and S. Pollock (2006). "Who is responsible for preparing science teachers?" Science, 313, pp. 445-446. [2] R. K. Thornton and D. R. Sokoloff (1998). "Assessing student learning of Newton's laws: The Force and Motion Conceptual Evaluation and the Evaluation of Active Learning Laboratory and Lecture Curricula." American Journal of Physics, 66(4), pp. 338-352. [3] V. Otero, S. Pollock and N. Finkelstein (2010). "A physics department's role in preparing physics teachers: The Colorado learning assistant model." American Journal of Physics, 78(11), pp. 1218-1224.

Conflicts: Please do not schedule concurrently with Chandra's other poster, "foothold principles for teaching physics."

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Abstract Title: Characterizing Noyce Scholars Physics Classrooms Using RTOP

Paper Type: Contributed

Author: Joseph L. Zawicki
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Speaker Order: DI09

The Robert Noyce Teacher Scholarship Program was initially authorized in 2002. SUNY Buffalo State initially received Noyce funding in 2004. There have been approximately 40 scholars in Phase 1 and 26 scholars in Phase 2. Fifteen of these scholars were physics concentrations. Of these 15, four scholars are currently teaching physics or physical science in New York state. Another six scholars are currently in education, but not necessarily teaching physics or are not in the New York area. Of the remaining scholars, two have not yet completed the program. The selected Noyce physics scholars were observed, in the spring of 2015 semester, using the Reformed Teaching Observation Protocol (RTOP). Each scholar was observed several times; the observations were pre-arranged with paired observers. The resulting scores, with sub-scores, will be reported along with inter-rater reliability data. This data is a sub-set of a larger study of Noyce Scholars at Buffalo State.

Footnotes: Catherine Lange sponsored by J. Zawicki

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Abstract Title: Connecting the Reformed Dots: The Role that Summer Programs Play

Paper Type: Contributed

Author: Hagit Kornreich-Leshem
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Speaker Order: DI02

FIU has implemented a three-pronged retention approach that aims to create connections between typically isolated PER-driven reformed elements namely, a Bridge summer program, reformed introductory STEM classes and the Learning Assistant Program. We identify impacts of the summer Bridge program on student performance, retention rate, academic progress and performance in mathematics courses by comparing to a similar group of FTIC (First-time-in-college) engineering freshmen who haven't participated in the program. Bridge students had higher retention rates than all other FTIC Engineering students, higher average cumulative credit counts and GPA, and outperformed all other engineering students as determined by their overall GPA in their mathematics courses. While this effect is substantial, Propensity Score Genetic Matching shows no effect on cumulative GPA when covariates such as high school GPA and SAT Math scores are included in the matched group of non-participants. We discuss these results in light of the involvement of the cohorts in the other reformed efforts.

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Abstract Title: Implementing and Assessing Diverse Avenues of Student Support: The CSU S-STEM Program*

Paper Type: Contributed

Author: Mel S. Sabella
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Speaker Order: DI03

The CSU S-STEM Program supported by the National Science Foundation seeks to increase the educational attainment of CSU students and encourage more students to think of themselves as scientists. Chemistry and physics majors in the S-STEM Program receive tuition support at CSU, engage in a summer program based on the University of California-Berkeley Compass Project, participate in early research experiences during their first year at CSU, and engage in a peer and faculty mentoring program. Students also receive funding to support travel to attend conferences and present research and explore graduate programs, teaching careers, and careers in scientific research. An emphasis on the development of community, in addition to academic and scientific support, are essential elements of the CSU S-STEM Program and build on the resources of our students who mainly come from neighborhoods on the southside of Chicago.

Footnotes: * Supported by the National Science Foundation (DUE #1356523); Roth, N.; Gandhi, P.; Lee, G.; Corbo, J. The Compass Project: Charting a New Course in Physics Education. Physics Today [Online] 2013

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Abstract Title: Instructor Agency in Context: A Framework for Curricular Implementation
Paper Type: Contributed
Author: Mike Ross
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Over the past 130 years, many research and reform-based curricula have been implemented in attempts to engage students in authentic physics practices. Often, these curricular innovations have been studied using a framework that involves an assessment of fidelity to an ideal execution of the curriculum. Rather than applying a framework of fidelity, which can be difficult to define and even more difficult to measure, we examined the implementation of a PER-based introductory physics curriculum by eight instructors across seven contexts to better understand the interplay of curricular expectations, instructor agency, and learning context. We applied an analytical framework based on the degree and type of curricular challenges encountered and associated modifications by the instructor. We will present common challenges, various forms of instructor agency in managing these challenges, and implications for engaging instructors in course transformations.

Conflicts: Canceled since author did not register by the deadline date.

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Abstract Title: Learning Assistant Identity Development: Is One Semester Enough?
Paper Type: Contributed
Author: Jessica Conn
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Speaker Order: DI05
The physics department at Texas State University has had a Learning Assistant (LA) program in place for three years, supporting reform-based instructional changes in all sections of our introductory course sequence for majors. We are interested in how participation in the LA program influences LAs' identity as physics students and instructors; we have previously reported trends in increased community involvement and a shift in experienced LAs' concepts of what it means to be competent. Our interview data now include first-semester LAs, and we see a significant difference in physics identity development between these LAs and those with more experience. During their first semester, LAs seem to experience a state of unease with respect to teaching and learning. We explain this discomfort in terms of Piagetian disequilibrium around their conceptions of competence in teaching and learning, and examine evidence of their (re-)construction of identities of competence.

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Abstract Title: Mixed-Reality "Flight Simulator" for Physics Teaching: TLE TeachLivE™*

Paper Type: Contributed

Author: Jacquelyn J. Chini
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Speaker Order: DI07

TLE TeachLivE™ is a mixed-reality classroom that allows participants (typically K-12 pre-service or in-service teachers) to practice teaching with simulated students. Similar to a flight simulator for pilots, TeachLivE™ allows teachers to refine their skills without risk to real students, and to practice the same skills in the same instructional context several times. Here, we describe the use of TeachLive™ with a class of physics Learning Assistants (LAs). Each LA led a short discussion in the mixed-reality class, observed the other LAs lead discussions, and reflected with their teammates about the experience. After reflection, each LA re-taught the same discussion. Finally, LAs were asked to write about what they learned from their experience. We will focus on changes in their use of certain pedagogical skills, such as questioning, from their first to second interaction with the simulator as well as their reactions to the experiences.

Footnotes: *This work supported in part by NSF Grant Nos. 0808790, 0108787, and 0833210.

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Abstract Title: Researching Ourselves: How Are We Helping Faculty to Change their Teaching?

Paper Type: Contributed

Author: Alice Olmstead
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Speaker Order: DI08

Faculty professional development (PD) workshops are a primary mechanism used to increase the adoption and adaptation of research-based instructional strategies (RBIS). PD workshops draw in many physics and astronomy instructors and serve a critical role in changing instructional practices within our community. Our research focuses on two of the largest and longest-running workshops for faculty: the New Physics and Astronomy Faculty Workshop and the Center for Astronomy Education Teaching Excellence Workshop. We are developing a real-time professional development observation tool to document what happens during workshops. We reveal opportunities to improve these PD efforts through increased awareness of instructors' experiences and prior knowledge. We assume that all instructors have some pedagogical ideas that align with education research results, their "productive resources." We analyze interviews to demonstrate the nature of these resources and consider how different PD practices create different opportunities for instructors' resources to be built on.

Conflicts: If possible, we would prefer to have this talk come before the poster session that includes our poster (which has the same title and authors)

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Abstract Title: Students' Reasoning About the Responsibilities of Scientists and Engineers*

Paper Type: Contributed

Author: Ayush Gupta
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Speaker Order: DI06

Courses in science/engineering ethics as well as research on students' developing sense of ethics often emphasize the micro-ethics of research, mentoring, and publications. Little research or instruction focuses on how future scientists/engineers understand the social, ethical, environmental, economic, and political impact of their scientific and technological contributions. Towards addressing this gap in literature, we are creating case-study accounts of how future scientists/engineers think about their responsibility towards the social impact of their contribution. The case studies draw from video-taped semi-structured interviews. Our preliminary analysis suggests that how some students construe a scientist's/engineer's responsibility depends not just on rationalistic moral reasoning and personal experiences, but on the particular issue at hand (weaponized drones versus bridges, for example), on their sense of self as a future engineer, views about what is engineering, sense of nationality, emotions, targets of empathy, and ideologies/narratives available to them through participation in the

world at large.

Footnotes: *Work supported by NSF 1338700

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Date Last Updated: February 4, 2011