



AAPT Programs & Conferences Tools

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Sacramento - California (SM16) / Status: Inactive

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Generic Abstracts

PER: Diverse Investigations (Use this sorting category if you feel your work doesn't fall into the previous four PER categories.)

Abstracts Submitted (# 37)

Abstract Title: "Who Can Be an Engineer?" Investigating Attitudes and Self-Identification 5374

Paper Type: Contributed

Author: Jacqueline Doyle
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Robust physics and engineering identities are strong predictors of students' choice to pursue a degree in physics or engineering; students who go into either of these fields are often drawn from the same pool of potentially-interested high schoolers, who must decide between majoring in the two fields. Many studies of engineering students have treated them as a homogenous population or focus only on one sub-discipline, rather than distinguishing engineers between disciplines more carefully. Recently, we surveyed students on several attitudinal constructs, such as Grit, the "Big 5" Personality Traits, and Performance-Approach mindset, which have been correlated with the development of identity and academic success in these fields. Using data from the 2,966 introductory engineering students surveyed, we investigate the associations between student attitudes and both physics and engineering

identity and disaggregate by major to uncover differences and similarities which will help broaden a conversation about who "can" be an engineer.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Topical Understanding and Attitudes--G

Order

☐

Comment:

Identity Cluster

Update

Abstract Title: Algebra-Based Students & Vectors: Assessing Physical Understanding in Arrow vs ijk 5654

Paper Type: Contributed

Author: John B. Buncher

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A recent study of students in a calculus-based introductory physics course found that students performed significantly better on vector addition and subtraction tasks when the questions were given using the ijk representation instead of an "arrows-on-a-grid" representation, and also presented evidence that working knowledge of the ijk format was necessary to correctly perform vector operations in the arrow format. A follow-up study found that students in an algebra-based physics course also performed significantly higher in the ijk representation than the arrow representation in both one- and two-dimensional problems, even though no explicit ijk instruction was given in the course. In a subsequent investigation we asked students in the algebra-based course to physically interpret their answers, in order to assess if the higher performance on ijk questions indicates physical understanding or is the result of algorithmic "plug-and-chug" thinking. Our findings will be discussed along with instructional implications.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Problem Solving--G

Order☐

Comment:

Representations cluster

Update

Abstract Title: Applying Business Literature to Product Development in STEM Education
5493

Paper Type: Contributed

Author: Raina M. Khatri

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Over the past few decades many innovations to improve undergraduate STEM education have been developed, only to fizzle out as they struggle to find an audience. Funding agencies have noticed this problem and are putting increased attention on development projects that build in aspects of sustainability after the project funding has ended. In recent years there has been research done within physics and STEM education on developing and disseminating education research projects. But, there is a much longer history and body of literature with common goals in the business literature related to product development and innovation. In this talk I discuss product development and launching the product from a business perspective, and how what is known about this process can be directly applied to developing and propagating an education innovation.

Footnotes: Supported by the National Science Foundation under Grant No. 1122446

Conflicts: Monday will be tight for me but I think "PER: diverse investigations" is usually Tuesday or Wednesday anyway.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order☐

1

Comment:

Update

Abstract Title: Assessing the interactivity and prescriptiveness of professional development workshops 5163

Paper Type: Contributed

Author: Alice R. Olmstead

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Professional development workshops are a primary mechanism used to help physics faculty improve their teaching, and draw in many instructors every year. Although workshops serve a critical role in changing instruction within our community, we rarely assess them through careful consideration of how they engage faculty. In order to encourage a shift towards more reflective, research-informed professional development, we have developed an observation tool, the Real-Time Professional Development Observation Tool (R-PDOT), to document the form and focus of faculty's engagement during workshops. During this talk, I will describe the development of the R-PDOT and introduce example R-PDOT data from sessions at the Physics and Astronomy New Faculty Workshop. We intend this tool to serve as a catalyst for workshop leaders' critical reflection and a stepping stone for future research on faculty professional development.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Career preparation models: Understanding the interplay between education and industry 5387

Paper Type: Contributed

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The national need for a knowledgeable and diverse STEM workforce is a powerful motive for improving physics education and conducting physics education research. However, there is a need for coherent models for workforce training. Some STEM advocates believe training is the responsibility of higher education, while others see industry playing an integral and cooperative role. We studied career preparation using 30 semi-structured interviews with new hires and their managers in physics-related careers. We developed a data-driven model for where learning happens and how it transfers into the workplace, and found that essential learning occurs inside and outside of the classroom (e.g., hobbies, internships). We compared our model with others suggested in literature. Workforce development advocates would benefit from a holistic training model that encompasses higher education and industry. Further, physics departments would benefit from understanding the broad range of opportunities they can offer students for their future careers.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

2

Comment:

Update

Abstract Title: Classroom Instruction Promotes Posterior Medial Cortex Brain Activity During Problem-Solving 5099

Paper Type: Contributed**Author:** Jessica E. Bartley

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Understanding of physics-related concepts is often quantified through physics problem-solving (PPS) assessments. However, no study has characterized neurobiological processes underlying PPS or skill development via classroom instruction. We used functional magnetic resonance imaging (fMRI) to delineate PPS brain networks and probe differences resulting from classroom instruction. 15 students underwent pre- and identical post-instruction PPS fMRI sessions. We assessed brain activity and identified regions more engaged post- relative to pre-instruction ($P < 0.05$). Data revealed consistent fronto-parietal networks contributing to PPS. Moreover, significantly increased post-instruction fMRI activity in posterior medial cortex (PMC), accompanied by improved PPS scores, implicated this region's critical role in skill development. As PMC supports spatial memory and attentional focus [1,2], these novel neurobiological observations provide insight into how education experience may augment brain activity which, in turn, contributes to enhanced PPS skills. [1] Leech et al. 2014 Brain 137 [2] Vann et al. 2009 Nat Rev Neurosci 10

*You have submitted comments on this item***Change Session**☒ No ☐ Yes**Order**

3

Comment:

Update**Abstract Title:** Curricular Knowledge as an Entry Point for Responsive Instruction 5282**Paper Type:** Contributed**Author:** Amy D. Robertson

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Instruction that attends to and takes up the substance of what students are saying and doing – or “responsive instruction” – has the potential to transform learners’ participation in the practices of science, support learner agency and voice, and promote equitable participation in the classroom, while preserving the conceptual gains our field has so long prized. In this talk, we show that the development of curricular knowledge – in this case, an understanding of the purposes of questions or sequences of questions in the "Tutorials in Introductory Physics" curriculum – can support the enactment of responsive teaching practices among novice teachers. We suggest possible implications for teacher education and future research.

Footnotes: The material in this talk is based upon work supported by a Seattle Pacific University Faculty Research Grant and by National Science Foundation Grant Number 122732.

Conflicts: I am the presider for the "Physics Teaching for Social Justice" session, so please do not schedule my talk at a time that conflicts with this session. In addition, I have a medical condition that makes it difficult for me to reliably be up and about before 11:00 a.m. Please schedule my talk for sometime after 11:00 a.m. Thank you so much!

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Embedded experts: A productive approach to transforming undergraduate STEM education 5571

Paper Type: Contributed

Author: Stephanie Viola Chasteen

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In order to achieve broader educational change in STEM discipline, research suggests that

we need to engage faculty within a discipline, with opportunities to reflect on their teaching over long periods of time. One strategy which achieves this is the “embedded expert” model, where postdocs and other educational experts are partnered with faculty within a department to support course transformation. This model has been successfully used in the Science Education Initiative (<http://colorado.edu/sei>) at two institutions, using postdoctoral fellows as embedded experts. This model is being adapted and studied at 7 institutions, using various embedded experts, in a new NSF-funded project (TRESTLE; <http://www.colorado.edu/csl/trestle>) in order to test how this intervention can be implemented in different institutional contexts to propagate widespread STEM education reform. I will discuss the embedded expert model, past results, the variations used in TRESTLE, and how we plan to test them.

Footnotes: This material is based upon work supported by the National Science Foundation under Grant No. 1525331

Conflicts: I am also presenting two posters.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order



Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Equivalence of Web and Paper-based Physics diagnostic testing 5570

Paper Type: Contributed

Author: Joseph Fritchman

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Web-based administration of diagnostic assessments allows students to participate in research studies from internet connected devices while minimizing use of already limited classroom time. In order to examine determine the efficacy of web-based assessments, shortened versions of the FCI and iSTAR have been adapted to compare students' performances on web and paper-based versions of the assessments, taken both in the lab

and at home. Effects of context, content, cognitive load, and difficulty will be examined. Results show only minor differences between modes of testing and multiple benefits to the web-based version, including students' preference to complete the assessment electronically.

Footnotes: Sponsored by Lei Bao

Conflicts: If possible, it is important to be able to present while seated due to a medical condition causing occasional fainting when standing for too long.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order



Comment:

Research-based assessment instrument cluster

Update

Abstract Title: Examining Time-use in Introductory Calculus-based Physics Students 5255

Paper Type: Contributed

Author: Seth T. DeVore

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Student time use is a major element of success in any course, especially in physics courses in which expertise is earned largely through exposure to the problem solving process. Surveys were developed which probed the distribution of student time use across various typical tasks associated with the introductory, calculus-based physics sequence. These surveys were implemented at four points in each the fall 2015 and spring 2016 semesters. Two of these surveys explored time use during weeks in which students were preparing for the first two exams of the semester, while the other two were implemented during typical non-test weeks. Measurements of incoming student SAT/ACT score, student grade expectations and student test grades were taken. An analysis of this data, including how students at large and potential sub-categories of students regulate their time use in response to exam scores and grade expectations, will be discussed.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

4

Comment:

Update

Abstract Title: Exploring Disagreements through Positioning 5650

Paper Type: Contributed

Author: May H. Lee

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To provide opportunities to meaningfully engage with core concepts and practices in physics, an introductory mechanics course was designed where students collaborated in small groups to solve complex problems. Since solving problems requires groups to come up with ideas on how to move forward, disagreements occur when group members are not in accord with the same ideas. I present a case study that highlights how students in one group changed the ways they positioned themselves and each other over time during disagreements in their group work. Conversational analysis was used to analyze video-recordings of these disagreements. Initial findings indicate that while group members were self-positioning themselves as capable of doing physics, each member seemed to be other-positioning their peers in the group in different ways as they worked with each other over the course of three and a half weeks, leading to implications for future research and instruction.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

5

Comment:

Update

Abstract Title: Exploring Student Sensemaking through Layers of Epistemic Games 5528

Paper Type: Contributed

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Several studies have demonstrated the utility of epistemic games in understanding problem-solving behavior in physics. Many researchers acknowledge the issue of grain-size as a challenge when identifying epistemic games in data, but few papers discuss games with various grain sizes. In analyzing a problem-solving episode with upper division physics undergraduate students, we explore grain-size in an effort to understand student sensemaking. We identify distinct layers of epistemic games in the episode and look for relations between these layers.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Examining content understanding and reasoning--G

Order

☐

Comment:

Upper division topics

Update

Abstract Title: Facilitating Physics Education Reform: An Ethnographic Study of Organizational Change 5633

Paper Type: Contributed

Author: Diane C. Jammula
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Findings from PER have the potential to transform student learning if institutions and educators adopt research-based practices. With the goal to deepen students' understandings of physics and reach a wider range of students, this paper asks what attitudes & beliefs, rituals & practices, and structures facilitate or impede physics education reform at the departmental level. The setting is a small physics department at a minority-serving university in an urban center. Ethnographic methods were conducted for one academic year, including participant observation, fieldnotes, journaling, and interviews. Findings show negative beliefs about student ability and anecdotal educational philosophies work to hinder growth. Rituals including departmental meetings are spaces to voice beliefs. However, academic hierarchies, such as tenure, work to silence and validate different perspectives. Implications include the utility of organizational change theory to support physics education reform while avoiding the stalemate of defensive departmental culture.

Conflicts: My husband Pravin Jammula is also presenting. If possible, I hope our times do not conflict.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Helping engineers to become effective physics teachers – Part A 5313

Paper Type: Contributed

Author: Shulamit Kapon

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How can we attract top university physics and engineering students to a career in teaching physics? How should we structure our teacher training programs to fit and best prepare talented people to become effective physics teachers and educational leaders? The Views program, launched at the Technion – Israel Institute of Technology, invites Technion graduates back to the Technion to earn an additional bachelor's degree in the Faculty of Education in Science and Technology. This talk discusses the physics education track within this program and focuses on the changes that are being made in the four physics PCK courses to provide a better fit for this unique population of students. The underlying principle guiding the design is to train these prospective physics teachers to become “learning engineers” instead of “transmitters of knowledge”, and to shift their attention from “what I teach” to students’ engagement and their learning.

Conflicts: (1) This talk is the first in a series of two talks: Helping engineers to become effective physics teachers – Part A and Helping engineers to become effective physics teachers – Part B. Please schedule them one after the other in the same session. (2) Please do not schedule the talks on the July 16 or 17, since the second author is a religious Jew who cannot travel or work on Saturdays.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Helping engineers to become effective physics teachers – Part B 5314

Paper Type: Contributed

Author: Avraham Merzel

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How can we attract top university physics and engineering students to a career in teaching

physics? How should we structure our teacher training programs to fit and best prepare talented people to become effective physics teachers and educational leaders? We discuss the design, teaching, and learning in an innovative physics methods course that was structured as a workshop. This course is the first of four that focus on physics PCK in the Views program at the Technion – Israel Institute of Technology. The program invites Technion graduates back to the Technion to earn an additional bachelor's degree in science teaching. We present preliminary findings from a study that followed the students throughout the course, focus on the difficulties these pre-service teachers experienced with regard to the design and teaching of engaging lessons in physics, and discuss how we supported the students in this process.

Footnotes: Shulamit Kapon is the AAPT sponsor of Avraham Merzel

Conflicts: (1) This talk is the second in a series of two talks: Helping engineers to become effective physics teachers – Part A and Helping engineers to become effective physics teachers – Part B. Please schedule them one after the other in the same session. (2) Please do not schedule the talks on the July 16 or 17, since the presenting author is a religious Jew who cannot travel or work on Saturdays.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Identifying Different Student Groups using Cluster Analysis 5146

Paper Type: Contributed

Author: John C. Stewart

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This paper presents an analysis of the effect of pre-preparation and effort on the performance in a physics class using data collected over 21 semesters (N=1747). An overall significant negative correlation with total time out-of-class time invested was found

($p < 0.0001$). Cluster analysis was used to identify distinct subgroups of students with different levels of incoming preparation for the class and distinctly different out-of-class study behaviors. The highest performing subgroup invested the lowest out-of-class time but began the class with superior preparation in the material covered. Representation of students of different gender was not uniform across the set of clusters ($p < 0.0001$). Female students were underrepresented in the cluster of students with high pre-preparation and overrepresented in the cluster whose primary mode of exam preparation was reading. Male students were overrepresented in the cluster identified by the failure to submit required assignments.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

21

Comment:

Update

Abstract Title: Improved recruitment to build a better Faculty Online Learning Community
5469

Paper Type: Contributed

Author: Adrienne L. Traxler

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A Faculty Online Learning Community (FOLC) is a follow-up experience for participants in the Physics and Astronomy New Faculty Workshops. FOLC cohorts, comprised of faculty members from around the country, meet biweekly by video for discussion with guest speakers and with each other about implementing active learning in their classrooms. Between meetings, members continue conversations, post materials, and ask for advice in a private social media group. FOLCs are intended to support faculty in meeting the challenges of classroom reform, which can be substantial even after attending the New Faculty Workshop. As a secondary benefit, FOLC cohorts have also proved to be a sounding board and discussion space for a broader range of issues facing junior faculty. Here we describe the ongoing development of the cohort formation process, with a particular focus on how

recruitment and community-building efforts have evolved during the project.

Conflicts: Associated with two other talks: "Online Learning Communities to Support Scholarship of Teaching and Learning," lead author Andy Rundquist; and "How can asynchronous communication support virtual faculty learning communities?," lead author Joel Corbo. This talk should be the first of the three.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

2

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Linking workshop design to faculty's engagement in professional development 5414

Paper Type: Contributed

Author: Chandra Anne Turpen
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Faculty often become motivated to try research-based instructional strategies (RBIS) after attending professional development workshops, but they are often underprepared to succeed in using RBIS [1]. In order to further explore the outcomes of faculty professional development, we analyze video-recordings of faculty's interactions during the Physics and Astronomy New Faculty Workshop. We select workshop episodes using our Real-time Professional Development Observation Tool, which allows us to identify instances where faculty members are voicing their ideas and collaborating with each other. We consider how workshop leaders' design decisions seem to influence faculty's engagement, e.g., how faculty take up workshop instructions, make sense of workshop activities, share and elaborate on their ideas, and justify their arguments. Lastly, we discuss the potential implications of these findings for faculty's future teaching practice.

Footnotes: [1] C. Henderson, M. Dancy, M. & M. Niewiadomska-Bugaj (2012). Phys. Rev. ST-PER, 8(2), 020104.

Conflicts: Please do not schedule this session simultaneously with either of the following two invited sessions: Rachel Scherr's Preparing and Supporting University Physics Educators AND Mel Sabella's Knowing and leveraging the strengths of diverse populations in the physics classroom

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Making Use of Resources: Nudging and the Opportunity for Revisions 5524

Paper Type: Contributed

Author: Evan Halstead

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In the fall of 2015, I instituted a revision policy in my classes in which students could change their grades by revising their work and then speaking with me during 5-minute weekly sessions. Students in one section of a calculus-based introductory physics course at a small, liberal arts college signed up for weekly meeting times at the beginning of the semester. Students in a second section of the same course were allowed to meet with me any time during office hours. I kept track of how many students showed up to these meetings each week as well as the days of the week in which they came to see me. In this talk I will discuss the differences that I observed between the two sections.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order



Comment:

Teaching method evaluation cluster

Update

Abstract Title: New resources on PhysPort: Supporting physics teaching with research-based resources 5506

Paper Type: Contributed

Author: Sarah B McKagan

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Physics education researchers have created research results, teaching methods, curricula, and assessments that can dramatically improve physics education. PhysPort (www.physport.org) is the go-to place for ordinary physics faculty to find resources for research-based teaching and assessment. First released in 2011 as the PER User's Guide, PhysPort has undergone re-branding, redesign, and expansion, including many new resources: overviews of over 50 research-based teaching methods and over 50 research-based assessment instruments, Expert Recommendations, the Virtual New Faculty Workshop, the Periscope collection of video-based TA training and faculty professional development materials, and the Assessment Data Explorer, an interactive tool for faculty to get instant analysis and visualization of their students' responses to research-based assessment instruments including the FCI, BEMA, and CLASS, and compare their results to national averages and students like theirs. The development of PhysPort includes research to determine faculty needs and usability testing to ensure that we meet those needs.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

5

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Novice Index Representation of Conceptual Transformation during Physics Instruction 5177

Paper Type: Contributed

Author: Michi Ishimoto

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The Newtonian score representation of students' understanding of force and motion concepts has been a standard index in quantitative studies on conceptual transformation. Whereas students' proficiency before physics instruction is associated with learning gain, the robustness of novice views is attributed to learning inefficiency among low proficiency students. This study attempts to relate the inefficiency and the robustness of the primary commonsense conceptions by devising a noviceness index using a large number of students' pretest and posttest results on the Force and Motion Conceptual Evaluation. The results show that the proportion of change from novice responses to correct responses increased with an exponential regression curve, with R^2 close to 1. The exponential rate of the transformation of a novice view could bring forth empirical data on other aspects of this transformation, such as what is involved in the rewiring of a neural network to build a new network.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Research-based assessment instrument cluster

Update

Abstract Title: Online Learning Communities to Support Scholarship of Teaching and Learning 5204

Paper Type: Contributed

Author: Andy Rundquist

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Faculty Online Learning Communities (FOLC) have recently been added to the New Faculty Workshops for Physics and Astronomy to help foster reflective teachers who are aware of and successfully adopt evidence-based pedagogical strategies. FOLC participants are encouraged to research their own teaching and the FOLC serves to support them and provide opportunities for communal research. This presentation will detail the first round of this research including an effort by several participants to have their students assess the work of their colleagues' students on the same lab taught at multiple institutions.

Footnotes: Please try to schedule this back-to-back with Adrienne Traxler's submission entitled "Building a better Faculty Online Learning Community: Recruitment focus"

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

3

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Pathways to a physics degree: A statistical story 5134

Paper Type: Contributed

Author: John M Aiken

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Michigan State University (MSU) has collected a wide body of data on students for over 10 years allowing for a robust, statistical picture to be painted of how students enter and exit the physics world. This data includes course grade, gender, ethnicity, student major choices, etc. and can help us paint a pathway of every student who has received a physics bachelor's degree at MSU. While this data set contains over 100,000 students who have taken math and physics courses at MSU only 2% of these students have declared a physics major and only 0.5% of students have gone on to graduate with a bachelors in physics. Students who declare physics and then move away from the major perform poorly in introductory courses and are demographically different from the typical physics graduate.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Topical Understanding and Attitudes--G

Order



Comment:

Identity cluster

Update

Abstract Title: Probing Indicators of Studio-mode Physics Student Success through Instructor Interviews 5317

Paper Type: Contributed

Author: Jarrad W.T. Pond
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As part of a project to explore successful strategies for using studio methods, such as SCALE-UP, we are investigating attitudes that students possess and actions they take that bolster or hinder success in their studio-mode physics courses. We interviewed SCALE-UP physics instructors at two large-enrollment research universities to explore their perspectives

on the student-level variables that influence students' chances of excelling in their algebra-based studio-mode physics courses. We developed a coding scheme to characterize the beneficial and detrimental student qualities instructors observe and the actions instructors take to encourage beneficial student attitudes/behaviors and discourage detrimental ones. We present a snapshot of the coding scheme used and discuss common ideas about studio-mode physics student success identified by our participants.

Footnotes: This work was funded by the National Science Foundation (Grant No. DUE-1347515).

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

☐

Comment:

Teaching method evaluation cluster

Update

Abstract Title: Situated Self-efficacy in Introductory Physics Students 5223

Paper Type: Contributed

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Students' perceptions of self-efficacy in the general university environment have been extensively studied and findings suggest that self-efficacy plays a role in student success. The role of perceived self-efficacy in Science, Technology, Engineering, and Mathematics (STEM) student success is investigated in the current research. A survey measuring students' feelings of self-efficacy within multiple environments, including science, mathematics and physics classes as well as within their major department and intended future career, was developed based on Pintrich et al. "Self-Efficacy for Learning Performance" subscale of the Motivated Learning Strategies Questionnaire. The survey was administered over the fall 2015 and spring 2016 semesters and demographic data was gathered for the introductory, calculus-based physics classes. An analysis of student perceived self-efficacy and its relation to student success will be discussed. The effect of gender and major on perceived self-

efficacy and student success will also be explored.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Topical Understanding and Attitudes--G

Order

☐

Comment:

Identity cluster

Update

Abstract Title: SPOTing Effective Teaching: An Engaging and Reflective Faculty Workshop Series 5510

Paper Type: Contributed

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Because so few physics faculty are formally trained in education and pedagogy, in-service faculty professional development workshops are important for improving teaching skills. While these workshops often address the importance of engaging students in active and reflective classroom activities, emergent research suggests that more can be done to engage faculty workshop attendees in active and reflective activities. In this presentation, we discuss analysis of data collected from implementation of the SPOTing Effective Teaching Workshop series, a professional development experience that integrates use of the Student Participation Observational Tool (SPOT) within a faculty community of practice. This experience incorporates interactive and reflective elements to guide faculty in a shared experience of analyzing their teaching and discussing alternative approaches. Results indicate that as a result of this experience, faculty articulate pedagogical discontentment and identify desired changes to their teaching practice that are more in line with active, student-centered approaches.

Footnotes: Research Funded in part by NSF

You have submitted comments on this item

Change Session

☒ No ☐ Yes

--Select here if you would like to change the session --

Order

8

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: STEM workplace communication and implications for the physics curriculum 5442

Paper Type: Contributed

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Though communication is essential for success in STEM careers, it is typically a minor focus within the undergraduate physics curriculum. With the emphasis of argumentation in K-12 NGSS and key role of collaboration and discussion in active learning environments, it is important to more fully understand how such practices prepare students to communicate effectively in STEM careers. We conducted 30 semi-structured interviews with new hires and their managers in academia and industry, using the field of optics as a disciplinary focus. We coded these interviews using emergent and grounded theory approaches to better understand how communication skills were developed and used in the workplace. Findings include a taxonomy of diverse communication skills ranging from written (e.g. documentation), visual (e.g. interpreting diagrams), and oral (e.g. asking questions) communication. In each case there were unexpected situations where communication was necessary and inseparable from technical knowledge used in the workplace.

You have submitted comments on this item

Change Session

☒ No ☐ Yes

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Order

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Comment:

Update**Abstract Title:** Student feedback as a tool in physics course development 5187**Paper Type:** Contributed**Author:** Ilkka V. Hendolin

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The effects of instructional reforms in university physics are typically evaluated through formative assessment, standardized concept inventories and/or attitude surveys. In addition, student feedback is collected by many departments, but reports of its use in course development are rare. At the University of Helsinki, Finland, student feedback has been regularly collected at fundamental physics courses since 2007. Over the years, feedback has proven to be an invaluable source of information for course development. It has revealed characteristics of physics courses and effects of instructional reforms hardly found by other means. Key factors for success are that all students have been motivated to give their considered opinions and feedback is solely used for the purposes of course development (and not e.g. for faculty promotions). In the talk, the feedback procedure will be presented along with examples of findings.

*You have submitted comments on this item***Change Session**☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

Comment:

Teaching method evaluation cluster

Update**Abstract Title:** Supplemental Instruction leader development: A longitudinal study 5656**Paper Type:** Contributed**Author:** Sissi L. Li

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Supplemental Instruction (SI) is a program developed to target gateway courses with low passing rates. Students in these courses have the option to attend regular sessions outside of lecture where they are guided through problem solving and learning through group work. Each session is led by an SI leader, a student who has done well in the course and has applied for the position. Because student success is the primary goal of the program, much of the research focuses on student success. However, SI leaders also learn and grow significantly as a result of participating in the program. In this study, we have conducted longitudinal interviews with SI leaders in STEM disciplines to examine their experience in the program. We will present findings about the SI leaders' ideas about teaching and learning, their growth as content experts, and professionals in their fields.

*You have submitted comments on this item***Change Session**☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order☐

Comment:

Faculty/LA preparation cluster

Update**Abstract Title:** The Access Network: Working Towards More Equitable and Inclusive STEM 5504**Paper Type:** Contributed**Author:** Angela Little

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The Access Network consists of six university-based programs co-working with graduate and undergraduate students from across the country towards a vision of a more diverse, equitable, inclusive, and accessible STEM community. To realize this vision, Access and its member programs empower students as co-leaders, giving them voice and ownership over local and national efforts. Access sites focus on fostering supportive learning communities, engaging students in authentic science practices, and attending to students' development as STEM professionals. Programmatically, sites offer a range of services from summer programs to academic year mentoring. In this talk, we will share preliminary evidence of our network's efforts: (1) building a community of student representatives committed to communicating across sites, celebrating local successes, and supporting each other through local struggles, (2) developing and implementing our first in-person gathering of student representatives from Access sites, and (3) fostering routines for sharing of ideas across sites.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Topical Understanding and Attitudes--G

Order

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Comment:

Update

Abstract Title: The Effects of Grader Assessment Feedback on Student Self-Regulation 5564

Paper Type: Contributed

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Self-regulation is a self-initiated process through which students identify obstacles to their learning, find strategies that will allow them to overcome those obstacles, and finally exert

the effort needed to succeed. Through collection of student responses to a web-based survey, we investigate what student self-regulation looks like across different undergraduate physics populations. Specifically, we examine how different styles of feedback on assessments correlate with students' self-regulation. We combine two models of self-regulation – (1) the Winne & Hadwin model which describes how external feedback influences student self-regulation and (2) Zimmerman's cyclical model of student self-regulation consisting of the phases forethought, self-control, and self-judgement – to create an a priori coding scheme. Informed by our theory of self-regulation, we also develop emergent, open codes from the data. We hypothesize that instructors can use particular feedback to influence subcomponents of student self-regulation, aiding students' knowledge construction.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Topical Understanding and Attitudes--G

Order

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Comment:

Update

Abstract Title: The Evolution of Department-level Teaching Social Networks at One Institution 5391

Paper Type: Contributed

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Social network analysis (SNA) provides a means of studying connections among entities. The information found through SNA has many uses, including identifying key leaders, demonstrating the current state of a system, or documenting change through collecting data at different time intervals. As part of a larger evaluation project related to institutional change, we have collected SNA department-level data related to teaching networks (teaching discussion and advice) in several departments at one institution. These data have been collected every 2 years for the past 6 years. This talk will discuss whether and how these networks have changed, striking trends, and ways these data have been used.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

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Comment:

Faculty/LA preparation cluster

Update

Abstract Title: The importance of student voice in partnerships: Examples from the CSU Learning Assistant Program 5329

Paper Type: Contributed

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The CSU Learning Assistant (LA) program has grown from three students, in one discipline, to nineteen students, in five disciplines. Central to this growth is the cultivation of teaching partnerships between LAs and faculty. In these partnerships, student ideas are valued and leveraged to improve the program, inform LA programs across the country, and publicize the program at the local and national level. In this talk we explore how recent interviews with LAs and the implementation of an LA Panel at CSU allows faculty and peers to get a glimpse of the LA Program that would not be possible without student voice. We also explore how the use of student voice to inform the program can create broad scale buy in for the LA Program and other types of instructional reform in the STEM classroom.

Footnotes: * supported by the National Science Foundation (DUE #1356523 & DUE#1524829) and the Department of Education.

Conflicts: Please do not schedule in parallel with Invited session: Leveraging strengths of diverse populations.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Using conceptual blending to analyze student inquiry in computer-based environments 5190

Paper Type: Contributed

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Modern digital technologies allow students to engage in inquiry-based activities in topics that have traditionally been out of experimental reach, such as astronomy and particle physics. An expert-like understanding of a topic requires recognition and awareness of the different roles of formalisms, computer simulations and physical experiments. Conceptual blending (also known as conceptual integration) is a framework for describing cognitive processes. We will illustrate how conceptual blending can be used to interpret how students make sense of the motion of stellar objects, as they explore them in an interactive whiteboard based investigative group activity. Main findings include that students quickly accept the idea of being able to throw planets into orbit in the interactive computer environment. For consolidation of learning and for building an expert-like understanding, experiences from this playful activity and from everyday life have to be projected onto formal physics theory.

You have submitted comments on this item

Change Session

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Order

Comment:

Update

Abstract Title: What happens after paired teaching? Continued use of research-based instructional strategies 5542

Paper Type: Contributed

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Paired (or co-)teaching is an arrangement in which two faculty are collaboratively responsible for all aspects of teaching a course. By pairing an instructor experienced in research-based instructional strategies (RBIS) with an instructor with little or no experience in RBIS, paired teaching can be used to promote the adoption of RBIS. We report on several examples of instructors who were the relative novices in such pairs. Using data from in-class observations, the Teaching Practices Inventory, and interviews with the instructors, we characterize the extent to which they have continued using RBIS in the courses they have taught after pair-teaching. Preliminary results indicate both a continued use of RBIS when teaching in the same course that they pair-taught in and some transfer of RBIS to new contexts.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order

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Comment:

Faculty/LA preparation cluster

Update

Abstract Title: When buy-in is not enough: GTAs' RIOT profile in mini-studios 5222

Paper Type: Contributed

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Using the Real-time Instructor Observing Tool (RIOT) we observed six Graduate Teaching Assistants (GTAs) and coded for the amount of time they spent on various teaching actions to create an "action profile". The GTAs were teaching in a student-centered combined recitation and laboratory "mini-studio". At the end of the semester, we asked all GTAs to use the RIOT protocol to describe action profiles from several perspectives: 1) what the course designers want; 2) what the GTA thinks is most helpful; 3) what the students think is most helpful; and 4) what the GTA thinks his/her actual profile resembles. In this talk we compare the responses of an exemplary GTA to find a high amount of buy-in to the mini-studio method but an actual profile that more closely resembled what she believed her students wanted. These findings are supported by the GTA's other responses about her teaching experiences.

Footnotes: This work is supported in part by the U.S. National Science Foundation under grant DUE-1246024.

You have submitted comments on this item

Change Session

☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order



Comment:

Faculty/LA preparation cluster

Update

Abstract Title: Who let the cold out? 5473

Paper Type: Contributed

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In the MainePSP*, we have observed students improve the way they analyze thermal energy after instruction, but that many of them continue to use the idea that “coldness” transfers. Past researchers have identified that cold is commonly perceived as a separate heat energy. Nevertheless, we have not found specific activities to address this idea. We present the analysis of a collaborative session among K-12 teachers who were trying to analyze how to address coldness in the classroom. During the sessions, teachers got to model the energy in two different scenarios which include an object in room temperature interacting with snow. Then, teachers interacted with two simulations that address thermal energy to consider their utility as an instructional tool. Engaging teachers in these activities led to additional insights and questions about how to convincingly address students’ observable experience, that coldness transfers, using a thermal energy model.

Footnotes: *NSF MSP 0962805

Conflicts: I am the session organizer of PER findings related to Latin American Students, I would appreciate if this is not schedule at the same time.

You have submitted comments on this item

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☐ No ☒ Yes

PER: Evaluating instructional strategies--G

Order



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Faculty/LA preparation cluster

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