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Generic Abstracts

PER: Modeling student engagement

Abstracts Submitted (# 12)

Abstract Title: "Stupidity in Science" - NOS Lesson or Balm for Inquiry Angst?* 5361

Paper Type: Contributed

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Students in research-and-inquiry-based physics courses tend to feel uneasy with the lack of answers from the professor or textbook. Years of traditional schooling teach students to seek answers outside of their own reasoning. Also, students tend to bring to our classrooms unproductive views of science as being about "right answers" and they discount sense-making. Despite our efforts to encourage students to take risks and rely on their wits, many students feel unease about their ideas because they are not from authorities. Martin Schwartz addressed a similar concern among scientists in his essay "The importance of stupidity in scientific research". In this article Schwartz frames ignorance or stupidity as the essential driver of scientific research. We have investigated changes in student affect that result from reading this article as a homework assignment and find that, while students often misunderstand the point of the article, their feelings about the course improve considerably.

Footnotes: *The Inquiry into Radioactivity Project has been supported by NSF DUE grant 0942699. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Change Session

No Yes

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Comment:

Update

Abstract Title: Assessing difficult to assess learning goals - formative feedback in P3 5241

Paper Type: Contributed

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P3 is a transformed introductory mechanics course at Michigan State University that focuses on the development of scientific practices. The design team, as part of the P3 course design made explicit attempts to assess learning goals that can often be perceived as being a part of the hidden curriculum or considered difficult to assess (for example: learning to work productively in a group). This assessment is in the form of formative feedback with students receiving a numbered grade and reflective commentary based around their interactions in the classroom for the week. In this presentation, case studies formed from student interviews conducted at the beginning and end of the semester are discussed to highlight how the formative feedback received, effected changes in student interactions in class. The presentation also highlights students' reflections on the feedback and how the effect it had on them changed over time.

You have submitted comments on this item

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No Yes

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Comment:

Group cluster

Update

Abstract Title: Characterizing how students group themselves for group exams 5215

Paper Type: Contributed

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When using ad hoc student groups for group exams, how do students group themselves? Are there clear preferences for grouping by sex, ability in the course or years in university? In courses with multiple opportunities to form these ad hoc groups, do these preferences change as the course proceeds? This research is part of a larger study investigating the factors that contribute to group success, both in terms of the group's performance on that group exam as well as the performance of individuals on later assessments.

You have submitted comments on this item

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1

Comment:

Group cluster

Update

Abstract Title: Group formation on physics exams 5430

Paper Type: Contributed

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As our classrooms become more active and collaborative, we need to consider ways that our assessments can take on the same active and collaborative spirit that our classes have. One way that has come into practice is through the use of group exams. We hypothesize that student groupings are embedded within exam response data giving us an assessment of our students' social profiles. This makes group exam response data an untapped resource which can tell us more about our students than their score on an exam. Using a duplicate exam format, we are developing a method for analyzing group formation for a particular exam using the framework of network analysis. This method will be compared to self-reported student grouping data for verification. Looking forward, we will consider questions such as, "Who do I need to work harder to include in the class?" and "Who might make a good LA?"

You have submitted comments on this item

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No Yes

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2

Comment:

Group cluster

Update

Abstract Title: Longitudinal study of students' participatory habit in active learning classrooms 5591

Paper Type: Contributed

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Students' interactions can be an influential component of their success in an interactive learning environment. From a participation perspective, learning is viewed in terms of how students transform their participation. However, many of the seminal papers discussing the participationist framework are unclear on specific details about how students change their level of engagement in an active learning environment over time. As part of a larger project to understand the role of student participation in learning, we have gathered data that allowed us to quantify students' participation in active learning introductory physics classes structured around the Investigative Science Learning Environment (ISLE) philosophy. Using classroom observations, and students' self-reported network data of collaboration, we quantified students' participation in two settings of the class throughout two semesters. We examined how students change their participative behavior throughout two consecutive semesters and found that active learning without other intervention is insufficient for transforming students' participation.

You have submitted comments on this item

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Group cluster

Update

Abstract Title: Performance and Active Engagement through the Lens of Classroom Networks 5384

Paper Type: Contributed

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Theories developed by Tinto and Nora identify academic performance, learning gains, and student involvement in learning communities as important facets of student engagement that support student persistence. Collaborative learning environments, such as those

employed in the Modeling Instruction (MI) introductory physics course, are considered especially important. Due to the inherently social nature of collaborative learning, we examine student social interactions in the classroom using Network Analysis methods to analyze a survey administered periodically in class. We then calculate centrality, a family of measures that quantify how connected or "central" a particular student is within the classroom social network. Building on previous work indicating relationships between classroom interactions and performance, we investigate this relationship further to better understand how student engagement manifests in the context of a large-scale MI course at Florida International University.

You have submitted comments on this item

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3

Comment:

Group cluster

Update

Abstract Title: Research on Identity Trajectories in Undergraduate Research Experiences 5087

Paper Type: Contributed

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In this talk, we analyze shifts in students' identity trajectories as undergraduate physics majors participating in their first research experiences. Students in the study participated in an elective seminar in which they were paired with graduate student and faculty mentors on physics research projects and participated in a weekly discussions about research. Using video data from student interviews, classroom observations, research mentor interviews, and research observations, we study the development of students' identity trajectories. Relational dynamics between students and other members of the physics community contributed to the legitimization and delegitimization of students' physics identities. We highlight shifts in how students positioned themselves, and were positioned by others as

more and less central members of the physics community. Finally, we draw out connections between student trajectories, and discuss implications for future research and programmatic design.

You have submitted comments on this item

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No Yes

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Comment:

Update

Abstract Title: Splits in students' attitudes toward classical and quantum physics 5342

Paper Type: Contributed

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Instruments that measure students' attitudes and epistemological beliefs about physics often assume implicitly that "physics" is monolithic. That is, while there are multiple dimensions to student attitudes, physics itself is treated as a single discipline. We administered a survey in modern physics courses for engineering students, with modified CLASS (Colorado Learning Attitudes about Science Survey) survey items in which "physics" was changed to "classical physics" and "quantum physics," and found significant splits between students' self-reported attitudes toward classical and quantum physics, both pre- and post-instruction. Specifically, students display greater evidence of real-world connections and problem-solving sophistication with classical than with quantum physics. We also found that, under some conditions, quantum physics instruction was associated with a pre/post shift in attitudes toward classical physics.

Footnotes: This work is supported by NSF-DUE 1323129 and 1322734.

You have submitted comments on this item

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Comment:

Update

Abstract Title: Student positioning in an inquiry-based physics content and methods course 5127

Paper Type: Contributed

Author: Enrique A. Suarez
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This PER study focuses on university students in the physics content and pedagogy course, Energy and Interactions (formerly Physics and Everyday Thinking). By design, this course prepares future teachers and fulfills an undergraduate science requirement, thus enrolling students from a wide range of experiences and comfort with science content, from confident to struggling. The course is driven by students as they co-construct principles from lab-based evidence. This study asks how students describe and position themselves as learners in this environment, and how their positioning changes as they engage with different kinds of activities. We analyze students' weekly reflections and conceptual assessment scores. Preliminary results indicate that students are at first resistant to this student-driven model, but quickly start reporting feeling more confident in their abilities and reasoning, and begin valuing co-constructing knowledge with peers. We will present results and make inferences about how course components influence this shift in positioning.

You have submitted comments on this item

Change Session

No Yes

PER: Modeling student engagement--G

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Update

Abstract Title: Students' problem solving in an upper division Electromagnetic Field course 5295

Paper Type: Contributed

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As part of their upper-division electromagnetic fields course, students work in small groups to solve physics and mathematics problems during class. We categorize their epistemological framing along two orthogonal axes -- physics to math and algorithmic to conceptual -- to determine how shifts in students' framing interact with the instructor's framing and the problem at hand. Drawing from observational video data of classroom interactions, we characterize framing shifts over 50 episodes throughout two iterations of the course, seeking both diversity of student responses and diversity in problem type and duration. In this talk, we present our framework and some preliminary results.

You have submitted comments on this item

Change Session

○ No ◉ Yes

PER: Problem Solving--G

Order

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Update

Abstract Title: Traditional physics vs IPLS: Comparing student experiences 5608

Paper Type: Contributed

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At Swarthmore College, we recently introduced a first-semester Introductory Physics for the Life Sciences (IPLS) course that draws on authentic biological examples relating to kinematics, Newtonian mechanics, and thermodynamics. Because the course is offered only every other year, we are uniquely situated to compare the experiences of those students who take the IPLS course to a similar set of students who take a traditional first-semester introductory physics course that covers the same topics but does not foreground biological connections. In this talk we draw on conceptual and attitudinal survey data, as well as a series of case-study interviews, to describe the conceptual, epistemological, and affective differences that we observe between the two student populations. We identify the features of the IPLS experience that were most salient to students, and suggest how particular course structures may have been especially important in supporting students' ability to do well in the IPLS environment.

Conflicts: This talk is one of two paired talks contributed to the "PER: Modeling student engagement" session. The other talk is: Geller et al., "The source of student engagement in IPLS." Please, if at all possible, place these two talks back-to-back during the session. Thank you.

You have submitted comments on this item

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No Yes

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Update

Abstract Title: Using Clickstream Analysis to Understand Student Peer Evaluation 5425

Paper Type: Contributed

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Peer grading of student work has been used extensively in large-enrollment courses, but this evaluative practice has not yet been deeply explored in the context of student work submitted as videos. Georgia Tech has run three semesters of an introductory mechanics course in which students were required to create lab reports as videos and post them online. We investigate student grading behaviors by comparing students' ratings of peer-produced lab reports with the students' online (clickstream) interactions with those lab reports during the grading process. We discuss particular features of the peer-grading process which may influence student ratings and engagement.

You have submitted comments on this item

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No Yes

PER: Evaluating instructional strategies--G

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Date Last Updated: February 4, 2011