Rose-Hulman Institute of Technology

Center for the Practice and Scholarship Education
for the   and   of   of science, engineering, and mathematics students

Focal Point

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Upcoming Events

The winter book clubs will assemble soon. The two books—Bain's What the Best College Teachers Do and Weimer's Inspired College Teaching—are available in the CPSE Library Collection or online. Send your interest for Ella to coordinate schedules by November 22. The first meeting will happen during Week 1 in the Winter.

Research in Your Classroom: Dan Morris and Ella will describe the procedures for certification to perform human subjects research. Example applications will be provided and specific situations explored. Early winter term, in time to plan a project for the spring.

Flipping Your Class—Data and Practical Tips: Ross Weatherman and Rebecca DeVasher will share outcomes of their head-to-head comparison of two models of chemistry course and then give suggestions for getting toes wet in flipping. Late winter term, just in time to try a few things for your spring class.

March 3-4 (winter break Monday and Tuesday): Creating Significant Learning Experiences in Online Courses—two day workshop. The Learning and Technology group and CPSE are co-sponsoring this workshop, led by Stewart Ross and Linda Jacoby of Minnesota State University. They'll walk participants through creating several modules of an online course. The material is also relevant to F2F courses, so all are welcome to participate. More information coming soon.

And of course, the Observation Exchange is ongoing. Take the opportunity to see how your colleagues in other departments do what they do. Simply find a partner, sit in on each other's class, and have lunch on the CPSE to talk about it. Email Ella for the code word in the lunch line.

RHIT at ASEE Atlanta 2013

24 RHIT authors gave 17 presentations or posters at this year's ASEE conference in Atlanta (see the listing here; papers can be download by clicking on the title). Selected presentations:

Active Learning Requires Learning—Not Just Activity (Shannon Butler and Kay C Dee)
Capstone Design Alumni Survey (John Aidoo, Shannon Sipes, Jim Hanson, and Matt Lovell)
Leading Through Difficult Conversations (Julia Williams)
ROSE-BUD Mentoring and Professional Skills (Carlotta Berry and Deb Walter)
Getting Started with Screencasting (Sean Moseley)
SMARTER Teamwork (Richard Layton)
Developing Interactive Teaching Strategies for Electrical Engineering Faculty (Wayne Padgett)

ASEE 2014 is in Indianapolis June 15-18—plan to attend, you won't be disappointed!

Threshold Concepts—ideas to transform your teaching

Remember back to a day in your own learning, when you had an A-HA! moment that made so many other things in your field make sense. For me, it was figuring out the implications of ice being less dense than water. Such a simple idea, yet a whole view of ecology become clear in that moment. Whatever concept was your A-HA moment was possibly a threshold concept.

The formulation of the learning tool of threshold concepts came out of economics education research in the UK performed by Erik Meyer and Ray Land. Their work revealed key features of content concepts that, once learned, reshaped the understanding of the learner forever. These content concepts became known as threshold concepts.

Threshold concepts share several key features:

1. They transform the understanding of the learner, so that she begins to conceptualize her knowledge as if she was a professional of the field;

2. They are troublesome in that they are "counter-intuitive, alien, or seemingly incoherent" [1];

3. They are irreversible. Once the concept is understood, the learner is impeded from recovering the naïve state;

4. They are likely to integrate seemingly disparate aspects of a field; and

5. They contain boundaries that limit the applicability and purpose of the concept.

Other features have been ascribed to threshold concepts, but the list above provides an adequate framework. Threshold concepts have been identified in most areas of engineering and science, with especially rich descriptions in general engineering principles, electrical engineering, mathematics, and biology.

Focusing class time and student effort on fully engaging these ideas can have significant impacts on learning, although rigorous research using a course-basis or curriculum-basis is only recently being published. This area presents a ripe opportunity for meaningful contributions to the field.

For more information…

Cousin, G. 2006. An introduction to threshold concepts. Planet (Higher Education Academy journal) 17: 4-5.

Meyer, J. & R. Land. 2003. Threshold concepts and troublesome knowledge: linkages to ways of thinking and practicing within the disciplines. Occasional Report 4, ETL Project, UK.

Flanagan, M. Threshold concepts…a short introduction and bibliography. A wonderfully comprehensive compilation of research on threshold concepts, including hundreds of links to papers in most disciplines. Well worth 20 minutes of review to get a sense of the lay of the land in your area.

Land's plenary address at Elon University's Teaching and Learning Conference, 2011 (63 minutes)

[1] Perkins, D. 2006. Constructivism and troublesome knowledge. In: Overcoming barriers to student understanding: threshold concepts and troublesome knowledge. Eds. J. Meyer & R. Land. Routledge, London.

CPSE Website Revisions

The CPSE website is getting a new look. Greg McMullen and Steve Voltmer are assisting in bringing the CPSE website up-to-date with the current RHIT visual approach and enhancing the utility. Archived material and other resources will be readily available. Watch for the roll-out in mid-winter.

Center for the Practice and Scholarship of Education

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Faculty Spotlight

Diane Evans

Spotlight on Professor Diane Evans, specializing in teaching statistics. Evans likes to run her class like a conversation.

Read more about Diane Evans

Jim Hanson

Award-winning civil engineering educator Jim Hanson, PhD, believes teaching is more about giving students the ability to ask the right questions than providing future engineers with just skills to address tomorrow's challenging problems.

Read more about Jim Hanson

CPSE Services

- find resources about a variety of teaching and educational research topics
- get help carrying out an educational research project
- discuss course evaluation results and plan course improvements
- arrange to have classes videotaped and/or peer-reviewed
- brainstorm ideas for projects or proposals
- obtain peer feedback on grant proposal or manuscript drafts

Additional requests—simply email Ella at ingram@rose-hulman.edu.

Check out the IRPA/CPSE Collaborative site on Sharepoint here. Sarah Forbes, Shannon Sipes, and Ella collected various resources on Contemporary Education topics—a new theme each month.

Say Goodbye: Rachel returns to Virginia Tech

Please stop by D218 sometime soon to say goodbye to our visitor Rachel McCord. Rachel returns to Virginia Tech's Engineering Education department at the end of finals week. While here, Rachel has worked with multiple faculty/faculty teams on preparing research projects or formalizing studies. Her expertise in theory and design have been invaluable.

Rachel returns to VT to finish her dissertation, using data collected from RHIT students in this fall's Con Apps classes. She'll return to RHIT for a presentation (live or virtual) to share those results in the spring.

Thanks for sharing your expertise with us, Rachel. It has been great to have you.

Image from enge.vt.edu.

Better Questions are the Answer

Maryellen Weimer's recent post on the Teaching Professor Blog describes a typology of questions based on the work of John Andrews (original paper here). Andrews analyzed video of discussion sections in humanities to create a description of the types of questions instructors asked and the quality of responses. While the whole paper is worth reading, a few notable points emerge about good questioning strategies—basically creating divergent, higher level, straightforward, and structured questions. Some examples, listed in order of quality of response generated by students...

The playground question: the instructor establishes a sphere of examination to create common ground, and encourages students to explore within that sphere. "Let's see if we can make generalizations about this process as a whole, from the nature of these various products at hand. What do you see as indicators of process?"

The brainstorm question: the instructor establishes the theme, and invites students to contribute to the theme. "What possibilities are there for circumventing step seven of this manufacturing procedure?"

The focal question: the instructor poses set alternatives and requests justification for different decisions, generally producing a tone of debate. "Should the researcher use approach A, approach B, or approach C?"

Other question types are described in the article, but these three forms provide the boundaries, exploration, and higher level thinking we seek to encourage in class discussions. As a caveat, Andrews recommends "don't let complexity run rampant" and to choose a question form for a single session and stick with it. This last recommendation allows students to become familiar with the expectations for their contributions and will generally increase their ability to handle these higher level questions.

Give it a try in your next class period...

Blogs

Other interesting blogs: ProfHacker & Tenured Radical (Chronicle), Changing Higher Education, Higher Ed Mash Up (Inside Higher Ed), edCetera

● News Flash: Some students don't read email

A recent piece in the New York Times described what everyone already knows: students increasingly ignore email, preferring instead more social-media based communication strategies like Facebook or Twitter. As noted by one student, age 19: "Email has never really been a fun thing to use. It's always like, 'This is something you have to do.' School is a boring thing. Email is a boring thing. It goes together." Another student noted "I never know what to say in the subject line and how to address the person. Is it mister or professor and comma and return, and do I have to capitalize and use full sentences? By the time I do all that I could have an answer by text if I could text them."

This feeling about email is reflected in students' technology use. In one study, students allowed researchers to track their computer use. On average, computer time was 123 minutes a day, with 31 minutes spent on social media. Checking email accounted for only 6 minutes (although using the school's LMS did rack up 14 minutes). [1] But using Twitter doesn't seem much better—59% students followed none of the five hyperlinks posted to experimental Twitter accounts. A catch-22 for sure, and one not soon to be resolved.

[1] Junco, R. 2013. iSpy: seeing what students really do online. Learning, Media and Technology. See also Junco's interesting, research-based blog Social Media in Higher Education

[2] Johnson, K.A. 2011. The effect of Twitter posts on students' perceptions of instructor credibility. Learning, Media and Technology.

● New CPSE Resources available for check-out

Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th edition, 2014. John W. Creswell. This work walks readers through the process of experimental design, beginning with developing questions and approaches to working in theoretical frameworks to data gathering methods. A classic in the field and invaluable to educational researchers. This book was recommended by Rachel McCord.

Creating Self-Regulated Learners. 1st edition, 2013. Linda B. Nilson. Nilson's book describes practical strategies for encouraging self-regulation in the classroom (e.g. from/during lectures, exams, or other assignments). Issues like planning, grading, and how to start/finish are discussed at length. Recommended for those wanting to encourage a thoughtful, independent mindset in students.

Quiet: The Power of Introverts in a World That Can't Stop Talking. 1st edition, 2013. Susan Cain. An insightful analysis of the rise of the extroverts in culture but the continued influence of the introverts, Cain examines various historical figures, takes a few jabs at cultural norms, and describes how everyone can get along. See also her TED speech on the topic here. This book was anonymously recommended at the August Teaching Workshop.

The New Digital Shoreline: How Web 2.0 and Millennials are Revolutionizing Higher Education. 1st edition, 2011. Roger McHaney. McHaney describes the new *indigenous population* of students, constantly plugged in, with different expectations than us, working in ways that time-shift and time-slice. A simple addition of technology tools in the classroom will not meet these students where they are. McHaney calls for a reframing of perspective to allow us as faculty to become *co-learners* with the students we serve. Recommended by Shannon Sipes.

...and many more. Search for the CPSE collection on Fusion using the acronym CPSE and limiting to Rose-Hulman and printed material in the right-hand panel (or click here). You can also visit the collection in person on the first floor of the library near the Large Conference Room. Please recommend additional resources we should acquire.