

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

Focal Point

Contact

Ella Ingram
Email to ingram
X8507, D226
Call or drop by anytime.

In this Issue:

- Upcoming Events **1**
- ASEE Indianapolis 2014 **1**
- Try Something New **2**
- Considering Technology **2**
- CPSE Services **3**
- Say Hello: Courtney joins RHIT **3**
- Reflection in Education **3**
- Higher Education News **3**
- The Faculty Experience **4**
- New CPSE Resources **4**

Upcoming Events

The [August Teaching Workshop](#) convenes the 21st (9am to 4pm) and 22nd (9am to 12pm). All are welcome! Two changes this year: First, the CPSE will not provide breakfast this year—bring your coffee fix with you—but we will have lunch on the 21st. Second, paper copies of the workbook will be provided only by request—all participants will receive the workshop materials by email with fillable forms. Reserve your spot by emailing Ella by August 18th—indicate “August” in your email.

[Tom Angelo](#) of Classroom Assessment Techniques fame will be giving an [Advanced Teaching Workshop](#) on Thursday, August 28, co-sponsored with IRPA. Dr. Angelo will present [Fostering Critical Thinking across the Curriculum: Research-based Strategies for connecting Objectives, Teaching, and Assessment to Improve Learning](#). This workshop is meant to fulfill requests for an advanced option prior to school. The workshop meets 9am-4pm, with lunch provided. Plan on a great day of learning and working. Reserve your spot by emailing Ella by August 18th—indicate “Advanced” in your email.

This summer, a working group prepared guidance for [Supplemental Assessments of Teaching](#). These approaches include self-assessment, peer evaluation, and pre/post-testing. Be on the look-out for other resources and learning opportunities in this regard.

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 Indianapolis 2014

An amazing 50 RHIT authors gave 40 presentations or posters at this year’s ASEE conference in Indianapolis. Papers will be archived on the CPSE website. Presentations include:
Innovation Competencies (Bill Kline and Bill Schindel)
Get Your Feet Wet—Experiential Learning Activities along Lost Creek (Jennifer Mueller Price)
Video-based Online Learning: The Other Side of the Looking Glass (Daniel Kawano)
Preparing Your Teaching Portfolio (Kay C Dee, Glen Livesay, and Julia Williams)
Statistics in Engineering (Diane Evans and Mark Inlow)
Capstone Project in a Freshman Solid Modeling Course (John Mirth)

[ASEE 2015 is in Seattle June 14-17](#)—plan to attend, you won’t be disappointed! The call for papers from various divisions are already available [here](#) (but no dates yet—anticipate early October for abstract submissions).

● Try Something New This Term

Google “things to try on the first day of class” and a million suggestions appear. A lot of those recommendations relate to the business side of course management—what is the homework policy, how to contact instructors, classroom policies—or they focus on providing an introduction to or justification for the course. Those activities don’t establish a culture of learning in the same way that other simple strategies do. So, instead of management, try focusing on learning in the first few days. Below are some suggestions, translated with examples using technical content.

1. Give out the first exam from last year. Explain how what appears to be confusing or arouses feelings of ignorance will become old hat. Talk through how prior knowledge gets students at least part of the way to understanding a question or two. This strategy would be particularly appropriate for any course with a closely-linked prerequisite.
2. Encourage students to explore the topic in the context of what the state legislature is doing. A search on “engineering” of the Indiana General Assembly 2014 session records brings up 288 results; for “science” 198 results, and for “mathematics” 81 results. Students are likely to be ignorant of the legislature’s actions on these topics.
3. Plan to take students to an unusual event, and explain why. The ISU speaker series is bringing to Terre Haute a former Secretary of Energy, a political strategist, a boxing legend, and the Fonz (see listing [here](#)—dates spread over the year). De-Pauw’s Ubben Lecture Series brings globally recognized speakers to Greencastle (see [here](#)).
4. Send homework before the first day to have students find or take some picture relating to anticipated class topics and provide a very brief summary of the connection. For example, the High School Physics Photo Contest has amazing images in the database (see [here](#)); 16 years’ worth of winners are catalogued. The Civil Engineering Projects Facebook page [here](#) has hundred of beautiful images of amazing projects.
5. Use one of the Grand Challenges to establish motivation for the course materials (see the list [here](#)), and have student brainstorm things they’d need to know to start working on the problems. These topics often cross disciplinary boundaries, so are good targets for courses in several different majors. For example, the challenge “managing the nitrogen cycle” is applicable to chemical engineering (process efficiency), mechanical engineering (application/recovery equipment design), biology (genetic engineering of microbes), etc.
6. Administer a concept inventory and then let students generate their best possible answer with a peer(s). Concept inventories are available in almost every field. The idea here isn’t research, it’s establishing a baseline for comparison. Search [here](#), [here](#), [here](#), or [here](#) (chemistry) for inventories in your field (biology summary in PDF [here](#)). Or even easier, use the Background Knowledge probe from *Classroom Assessment Techniques* (in the CPSE Library).
7. Emphasize that students are participants in the learning environment by asking four key questions: A) In the best class I ever had, the teacher...[did these things]; B) In the best class I ever had, the students...; C) In the worst class I ever had, the teacher...; and D) In the worst class I ever had, the students... Use ground rules like no identifying features, no exaggeration (“she NEVER was on time”), and the lists have to be equal in size.

Lunde, J. ND. [101 Things You Can Do in the First Three Weeks of Class](#). University of Nebraska Office of Graduate Studies.

● Considering Technology

“The Amish are steadily adopting technology—at their pace. They are slow geeks...their manner of slow adoption is instructive: 1) They are selective...; 2) They evaluate new things by experience instead of by theory...; and 3) They have criteria by which to select choices.” (Kelly, 2010, *What Technology Wants*, New York: Viking Press)

“The need to know the capital of Florida died when my phone learned the answer. Rather, the students of tomorrow need to be able to think creatively; they will need to learn on their own, adapt to new challenges and innovate on the fly.” (Chivetta, student)

“Acquiring preemptive knowledge about emerging technologies is the best way to ensure that we have a say in the making of our future.” (Mota, TED, 2012)

● 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 data on people in higher education—new data and questions each month.

● Say Hello: Courtney joins us from Virginia Tech

Please stop by M240 sometime after August 20 to welcome our Fellow, Courtney Smith. Courtney is a Ph.D. student in Virginia Tech's Engineering Education department, researching mentoring of African American women in engineering. While here, Courtney will work with multiple faculty/faculty teams on preparing a research-based best practices guide for mentoring minority students. Her expertise in this area will be invaluable.

Courtney has a B.S. in optical engineering and an M.S. in electronics engineering, both from Norfolk State University. She is a grant recipient from NSF and the US Office of Civil Rights. Courtney is an active member of National Society of Black Engineers, ASEE, and Sigma Gamma Rho sorority.



Image from enge.vt.edu.

● Reflection in Education - a guest article from Patrick Cunningham

Students are the primary determinants of their own learning, which is supported by research showing strong connections between student metacognitive variables, student engagement, and student learning outcomes [1], [2]. Do we expect and require students to acknowledge and build on this responsibility in our classes? Naomi Silver, Associate Director of University of Michigan's Center for Writing, states: "...in learning and in professional practice, content and procedural knowledge alone are insufficient for persistent and self-directed growth in a learner's or practitioner's understanding and expertise. Additionally, knowledge about *how* one learns content or practices a procedure is required." [3]

It shouldn't surprise us that without opportunities to learn about them and practice them, self-awareness and self-regulation of one's thinking and learning does not develop as readily. David Whitebread demonstrated this in studying young children [4]. Silver agrees, citing "the clear importance of explicitly teaching students to develop metacognitive awareness and strategies to apply them in a range of situations [3]."

So what are some practical ways we can do this? To facilitate the development of metacognitive skills, embed required reflective elements in our classes and assignments (e.g., a "Muddiest Point" assessment). Require students to think about and reflect on their homework problems as Jim Hanson does. In a structural analysis class, students make educated guesses for the solution before working the problem. Then, as part of the assignment, students to explain why their guess was or was not correct. Exam wrappers are another effective reflective assignment. They encompass reflections on experiences before, during, or after an exam and have students connect their study choices to performance.

If any of these ideas have sparked your interest, then you are in luck. Rose-Hulman was selected to join the Consortium for Promoting Reflection in Engineering Education (CPREE), and we will be hosting many activities to learn about, develop, and assess reflective practices for our students over the next two years. Many faculty are already doing some form of reflective activities and we will be taking stock of those. We will also work to identify best practices for implementing reflective activities and assignments in our classes so that we can improve our current practices and develop effective new ones.

[1] Wang et al. 1990. *J. Educ. Res.* 84: 30-43.
 [2] Hu & McCormick. 2012. *Res. High. Educ.* 37: 738-754.
 [3] Silver. 2013. *Using Reflection & Metacognition to Improve Student Learning*. Stylus Press.
 [4] Whitebread et al. 2007. *J. Cogn. Educ. Psych.* 3: 433-455.

● The Faculty Experience

The [Higher Education Research Institute](#) at UCLA administers an annual survey of the faculty experience. Institutions participate on a voluntary basis. The most current data (from 2010-2011) reveal the status of the professoriate writ large. A few highlights are below. The complete report is available in PDF [here](#).

Stress: The most common source of stress among 4-year private college faculty is self-imposed high expectations (with 84% experiencing “some” or “extensive” stress). Other sources of stress included “lack of personal time” with 83% reporting at least some stress, “managing household responsibilities” with 77% reporting stress, and stress from personal finances occurred for 69% of the faculty.

Professional Development: 81% of faculty at 4-year private colleges have access to travel funds paid by their institute. 18% received an incentive to integrate new technology into their classrooms. 44% have access to internal grants for research. 36% of faculty respondents had participated in paid sabbatical leave.

Academic Experience: 45% feel to a great extent that the training they received prepared them for being a faculty member. Although only 32% report (to a great extent) a healthy balance between personal life and professional life, 65% of faculty report close alignment between work and personal values.

Personal Goals: The most commonly cited personal goals for 4-year private college faculty were “develop a meaningful philosophy of life” (86%), “helping others who are in difficulty” (76%), “helping to promote racial understanding (75%), and “mentoring the next generation of scholars (75%). The most infrequently cited goals were “influencing the political structure” (22%), “becoming a community leader” (23%), and “becoming very well off financially” (23%).

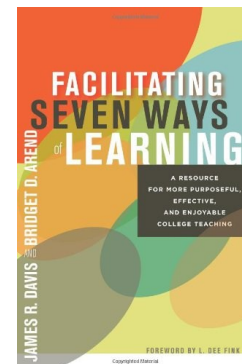
● New CPSE Resources

Make It Stick: The Science of Successful Learning. 1st edition, 2014. Peter C. Brown, Henry L. Roediger, and Mark A. McDaniel. As we know, many routine study habits just don’t work (think highlighting the text!). Brown et al. summarize the advances in cognitive psychology to give students and teachers strategies for promoting “durable learning”. A key message is “do the hard stuff”. The authors prepared a teacher’s guide to accompany the book—find it [here](#). This book was recommended by Rich House.

Cambridge Handbook of Engineering Education Research. Learners. 1st edition, 2014. Aditya Johri and Barbara M. Olds. Following calls for rigorous theoretical bases in engineering education, the community produced. This collection summarizes the key understandings in various realms: case studies, curriculum design, learning theories, diversity strategies, design education, engineering identity, and more. Recommended for those wanting to understand the current status of foundational topics in engineering education.

Facilitating Seven Ways of Learning: A Resource for More Purposeful, Effective, and Enjoyable College Teaching. 1st edition, 2012. James R. Davis and Bridget D. Arend. Targeted at experienced teachers, Davis and Arend explore the evidence-based strategies for tickling brains in different ways for different purposes. Intentional selection of a way for a particular learning objective has the potential to be quite powerful. A chart illustrating the seven ways is available [here](#).

Student Engagement Techniques: A Handbook for College Faculty. 1st edition, 2009. Elizabeth F. Barkley. This book does for active learning what *Classroom Assessment Techniques* did for evaluating learning. Ready-to-use approaches are described and illustrated. A great resource for those wanting to expand their repertoire of engagement strategies.



Search for the CPSE collection on Fusion using the acronym CPSE (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.

All unattributed material in this issue of *Focal Point* was written by Ella L. Ingram: ingram@rose-hulman.edu, for the Center for the Practice and Scholarship of Education, Rose-Hulman Institute of Technology, 5500 Wabash Avenue, Terre Haute, IN 47803. Contributions to issues of *Focal Point* are most welcome!