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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In this Issue:

Upcoming Events

Three great learning opportunities are happening this term. First, Courtney Smith will be presenting the workshop "The Climate in Your Classroom" focused on enhancing the experience for all students in engineering classrooms—10th hour December 2 in Olin 167. Courtney has used the research literature and Rose-Hulman's responses to the Center for Diversity climate survey to construct this interactive workshop. Be prepared to contribute your own good practices. This workshop is timed so you can implement some practices right away. Courtney is this year's CPSE Associate, and is also a Virginia Tech graduate student in Engineering Education.

Second, our own Richard Layton will be leading the workshop "Communicating Evidence Visually" on January 14, 8-11am in the Union. Richard will present key aspects of effective graphics design and then work with participants to enhance their own images. No computer needed; just bring an example you'd like to improve. Just in time for editing images for ASEE publications. Breakfast provided—confirm by emailing "evidence" to Ella by January 12.

Finally, the CPSE is joining the Consortium for Promoting Reflection in Engineering Education (CPREE) to sponsor this term's book club. We'll be reading Linda Nilson's *Creating Self-Regulated Learners.* The CPREE is providing books for those who confirm their participation by Thursday, December 4. Ella will email the first chapter and send meeting times on Friday. This book club is preparation for Dr. Nilson's visit in March—she will be the Spring Workshop presenter (more later).

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.

Upcoming Conferences

For those with an interest in education research, a number of conferences have open calls for proposals. Find more details by following the links. Listed in order of proposal due date.

Today   Research on Teaching and Learning Summit (February 20-21, 2015) CFP

Dec 12   Teaching and Learning Technology (March 12-13, 2015) CFP

Dec 15   Lilly Conference on College and University Teaching (May 28-31, 2015) CFP

Jan 9   International Conference on College Teaching & Learning (March 30-April 2, 2015) CFP

Jan 14   EDUCAUSE (October 28-30, 2015) homepage

Feb 6   Frontiers in Education (October 21-24, 2015)   homepage

Feb 9   Blended Learning Conference and Workshop (July 7-8, 2015) CFP

Better Note-taking in Class: A Key to Higher Performance

A recent issue of the National Teaching and Learning Forum (newsletter focused on higher education in practice) included a lengthy article from Marilla Svinicki of UT-Austin [1] about psychological research on note-taking, updated for the 21st century. Dr. Svinicki described some key results from research [2] that compared long-hand to laptop-based note-taking. The results with respect to performance were no difference between note-taking strategy when tested on factual recall questions, and better performance from the long-hand strategy on conceptual application questions. Further, the amount of verbatim notes was a negative predictor of performance.

This article and its recommendations (e.g. strategically placed pauses, minute papers, etc.) got me thinking about note-taking and how we do or do not teach the importance of note-taking. Something special happens when words go in, are filtered through an individual's brain and attempt to come out again on paper (or screen). My review of students' notes in the fall term when thinking about this article made me realize that most students just don't do a good job taking notes, and will almost never make notes when engaging in discussion or inquiry-based activities. So, here are a few ideas for encouraging better note-taking.

1. Encourage students to think about the mechanics of their notes. Spiral-bound notebooks are handy for ease of transport, but impose significant limitations on flexibility. Individual papers can be lost, but they can also be reorganized or examined individually or simultaneously. Writing on every line might capture a presentation reasonably well, but limits the ability to add summary details later. Multiple colors of ink can highlight key points or definitions, but managing different pens can be cumbersome. Complete sentences are good the night before the exam, but phrases allow one to capture more detail. The point here is to encourage thinking about the process and making decisions specifically rather than inadvertently.

2. Point out efficiencies that students can adopt in their notes, especially if those efficiencies are well-known in the field. For example, use 5 rather than five, "ex" for "example", "c to c" for center to center, "ts" for tensile strength, "Hsa" for *Homo sapiens,* "cm" for center of mass, "ZETA" for zero energy thermonuclear apparatus (I looked that one up!), etc.

3. Promote summarization or interpretation notes over transcription notes. Transcription is the least effective, most confusing, and most time-consuming (in the moment) method of note-taking. Summarization notes will probably end up looking like an outline of the presentation or discussion—key points and questions indicated, figures or data referenced noted, other relevant ideas that came to mind. Interpretation notes might result from a discussion—what key points did everyone make, how do those ideas connect, and what's the note-taker's opinion of the various points. Avoid transcription.

4. Remind students that the most important aspect of note-taking is reviewing and editing. All that material has to be processed again later. Give students prompts like "underline all definitions", "specify all acronyms", "answer the questions you jotted down", etc. Using a different ink color lets students see how their understanding is enhanced. Also, neuroscience tells us that frequent bouts with the same material make it stick much better. Reviewing and editing do that job.

[1] Svinicki, M. 2014. In note-taking, quantity and quality both count (or more is better but better is also better). National Teaching and Learning Forum 23(5): 11-12. See Ella for a copy. [2] Mueller, P. and D. Oppenheimer. 2014. The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science* 25: 1159-1168. The original research is here.

ProfHacker Tidbits (from the Chronicle of Higher Education)

Consider the difference between activities that move forward your professional and personal goals (Gain activities) and those that allow you to avoid problems in the future (Preventing Pain activities): "Because human beings tend to avoid suffering whenever possible, we can easily be consumed by Preventing Pain...Most of us have had the experience of sometimes being busy all day but not feeling like we really accomplished anything...we're spending most of our time Preventing Pain. [Book author] McClatchy...offers strategies like scheduling Gain activities as appointments in your calendar to ensure that you have at least small windows of Gain in most days, and breaking Gain projects down into small, manageable steps." Natalie Houston's original post is here. The ProfHacker blog is productivity-focused, with a bit of technology thrown in.

● 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 Share-point here. Sarah Forbes, Shannon Sipes, and Ella collected various data on people in higher education—new data and questions each month.

● Research Update: Influence of Cocurricular Activities

Students who participate in cocurricular activities are more academically engaged than students who do not participate in co-curricular activities, even when the two groups have the same levels of self-efficacy (e.g. self-perception of one's ability to achieve desired outcomes in academic settings), according to research reported in the October issue of Journal of Engineering Education [1]. This pattern was especially strong for when "cocurricular activities" was limited to academic activities—things like informal study groups, laboratory groups, professional societies, and women and minority societies. These outcomes derived from an analysis across four culturally and geographically varied institutions, involving 904 engineering and computer science students. A major implication of the work was that for students with low self-efficacy, participating in any cocurricular activity (academic or non-academic, like sports teams or Greek organizations) can help them "sustain interest in their classes even when they do not feel as capable as their peers". [1] Wilson, D., Jones, D., Kim, M.J., et al. 2014. The link between cocurricular activities and academic engagement in engineering education. *Journal of Engineering Education* 103(4): 625-651. Paper in html for ASEE members here; all others email Ella for a copy.

● Reflection in Education: CPREE Update

Submitted by guest author Patrick Cunningham

On Wednesday, November 5 we held the "Reflection in the Classroom" panel and lunch as part of the Consortium to Promote Reflection in Engineering Education (CPREE). Panelists (Ashley Bernal, Sriram Mohan, Ross Weatherman, and Julia Williams) and participants highlighted the value of reflection for helping students to engage material more deeply and even engaging the material in new ways that wouldn't otherwise be possible. Discussion also focused on practical issues. Students need to know the relevance and importance of reflective habits. Transparently modeling our reflective habits and situating reflection in authentic contexts, *e.g.*, through accountability on design teams, were key strategies from our conversation. Barriers to taking or giving time to reflect were also explored. The preponderance of content and the pace of instruction were cited as obstacles. Students need to have time and space to think, reflecting on content to make sense of it or reflecting on themselves as developing learners to develop better learning strategies and habits. As instructors and staff, we can make time for student thinking and guide their thinking with appropriate frameworks, but this practice will require careful consideration of what content is required and valuing role of reflection in developing deeper and lifelong learning in our students. One participant quipped that if enough of us were employing reflection in enough classes across disciplines, that maybe we would start to inculcate the habit of reflection in our students.

The next opportunity to join conversations on reflection will be through the winter CPSE book discussion groups. We will be exploring Linda Nilson's *Creating Self-Regulated Learners*. The first chapter provide background and theory and sets up chapters 2-12, which are loaded with practical ideas for reflective activities and assignments that help students develop self-regulated habits.

The CPREE is interested in how Rose-Hulman faculty use reflection in their classrooms. If you employ assignments, activities, or other strategies to encourage reflection, please contact Patrick Cunningham at cunningh@rose-hulman.edu with a brief description.

Entrepreneurship Education at Rose-Hulman

Submitted by guest author Grant Hoffman

With the help of a first-year grant from the Kern Family Foundation, Rose-Hulman joined the Kern Entrepreneurial Engineering Network (KEEN) to bring entrepreneurial-minded learning (EML) to campus. Whereas the ESCALATE program focuses on startup creation in the state of Indiana, EML focuses on the broader mindset of an entrepreneur, developing the skillset in Rose-Hulman students that encourages them to be more curious about their surrounding world, connect pieces of information from multiple sources to gain insight, and create value, not simply in monetary terms, but values in terms of societal or social benefit as well. The Kern Family Foundation and Rose-Hulman share the vision that this skillset will give students a vision for the breadth of their possible futures, and will prepare them to achieve these futures.

The aforementioned first-year grant provided opportunities for EML infusion in two Operation Catapult sections, five courses, and multiple events within the Leadership Advancement Program. The information gathered through this work and lessons learned were used to shape the subsequent proposal presented to the Foundation on Nov 4th. This proposal, the largest institutional grant awarded to a KEEN school to-date, provides $2.25M to continue this work for an additional three years, creating courses infused with EML principles, engaging faculty as entrepreneurial-minded educators, and providing student experiences that will foster their entrepreneurial mindset both inside and outside the classroom.

If you are interested being involved, please contact Grant Hoffman, Rick Stamper, or Craig Downing to learn more, or attend an information session on either December 16th or 17th, 10th hour, in O157.

New CPSE Resources

Cheating Lessons: Learning from Academic Dishonesty. 1st edition, 2013. James M. Lang. From Amazon: "Nearly three-quarters of college students cheat during their undergraduate careers, a startling number attributed variously to the laziness of today's students, their lack of a moral compass, or the demands of a hypercompetitive society. For James Lang, cultural or sociological explanations like these are red herrings. His provocative new research indicates that students often cheat because their learning environments give them ample incentives to try--and that strategies which make cheating less worthwhile also improve student learning. *Cheating Lessons* is a practical guide to tackling academic dishonesty at its roots." Agreed on all points.

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.
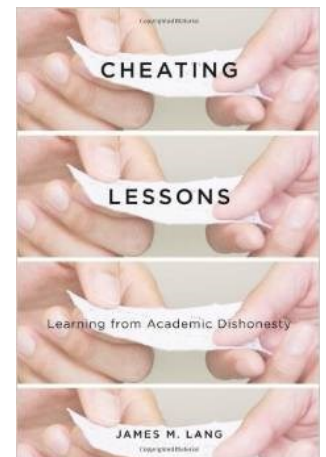
All unattributed material in this issue of *Focal Point* was written by Ella L. Ingram: ingram@rose-hulman.edu.

Contributions to issues of *Focal Point* are most welcome!

TEACHERS LOUNGE
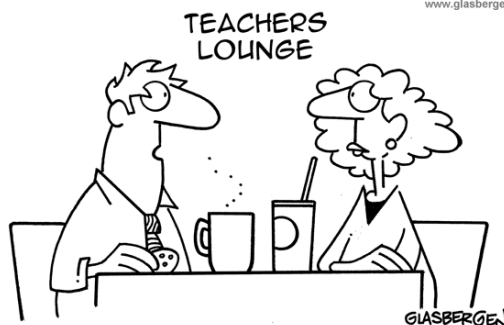
"The kids don't listen, so I have to repeat myself. I'm always repeating myself. You know, always saying the same thing more than once. I say it once, and then they make me say it again..."

"I'm behaving well. Are you sure you wouldn't like to positively reinforce it?"