Rose-Hulman Institute of Technology Spring 2016/17

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

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In this Issue:

Upcoming Events

INTERESTING IDEAS! Have something to say? Speak up! Want to know what's on your colleagues' minds? Come have lunch! Lightning Talks will be hosted this spring, co-sponsored by the CPSE and Associate Dean of Innovation. As a presenter, you get 15 minutes and 15 slides max to share your ideas—any topic is fair game. As an attendee, you get lunch and to hear what's on the minds of your colleagues. Email Brenda Mardis at mardis@rose-hulman.edu to reserve a spot—5th hour on Tuesday 03/14 and Wednesday 04/26. Lunch seating limited to 20; indicate what day(s) you'll attend. Regulars—invite a colleague. SPEAKERS WANTED!

STRATEGIC CAREER DESIGN! Susan Robison, author of Peak Performing Professor, will facilitate the spring workshop on mapping your ideal career as an academic professional, and is appropriate for faculty and professional staff at any career stage. This all day workshop meets Wednesday, April 19th at Ventures. Space is limited, so register early by emailing Brenda at mardis@rose-hulman.edu. Lunch is included, as is a meaty workbook. This workshop promises to be a great experience. Patrick Cunningham and Ella attended a workshop by Susan in November, and it was amazing. Register now!

CREATING VALUE! Craig Downing, Bill Kline, and Ella team up to provide a fresh look at value. No, it isn't just about money. This workshop will explore a model for examining the match between stakeholder needs and features in products, processes, and more. This approach is applicable in the classroom and as a way to explore your contributions to your department, discipline, and the institute. Join the fun! Lunch provided, limited to 30 participants. Email Brenda for your reservation. This session will occur Wednesday April 5th, 5th-6th hours, in 0201.

BOOK CLUB! This term's book is Small Teaching (link for synopsis, James Lang). Send in your reservation by March 9 to Brenda at mardis@rose-hulman.edu (even earlier is better—I will hand deliver a book to you ASAP). Meeting times are arranged based on participants' schedules. The CPSE provides the books! Come share some fellowship, hard thinking, and interesting discussion with a book club. This book was chosen by request—what book should we read next?

PRODUCTIVITY! Interested in increasing your writing productivity? Any kind of writing is applicable—newsletters, autobiography, conference papers, blog posts, you name it. We'll meet with peers and report on progress made and commit to future work. You write. Repeat five times. Any writing project will do. Scheduled to accommodate all participants. You want to try this! Email Brenda at mardis@rose-hulman.edu by March 9.

What other programming would you like to have? What topics are you curious about? Have a book suggestion or favored resource? Please send ideas to Ella for future events.

Book Review: Engineering and Social Justice

Guest article from Jeremy Chapman, CEE

Engineering and Social Justice: In the University and Beyond, Edited by Carolie Baillie, Alice L. Pawley, and Donna Riley (Purdue University Press)

The concept of ethics as a component of an engineering education is well founded, and many efforts are undertaken to make sure that our students understand that which is, and which is not, "ethical". The same, however, cannot often be said for the idea of "social justice". Truly ethical behavior can often run afoul of being socially just. The book "Engineering and Social Justice: In the University and Beyond" is a collection of nine essays (organized as chapters) that delve into various lessons that could be used in the classroom to help better illustrate what is meant by social justice, and how to get students to think more socially just.

Beginning with teaching and learning at the basic concept level, the authors of the first chapter (Cardella, Zoltowski, and Oakes) seek to utilize service learning to develop human-centered design practices and perspectives. Proper engineering design is not just about developing the next new idea or improvement, but also making sure it can be used safely and correctly by those for whom it was developed. Chapter Two (Ricco and Ohland) takes us beyond just the basic human focus into an ethnographic study of social justice themes, with some of the main outcomes being a need to better understand socioeconomic and racial factors within engineering.

Chapters Three through Five each delve into the development of classroom projects and outcomes designed to promote social justice. Chapter 3 (Pawley) looks to redefine what counts as "engineering", with a primary focus on the underrepresentation of women in the practice (by current definition). Chapter 4 (Baillie) focuses on materials research and trying to incorporate ways to utilize waste products (not just dump them). Chapter Five (Catalano) takes a similar social justice approach to the fields of turbulent fluid mechanics and high speed weapons.

The third part of the book moves beyond the classroom and into engagement with the local and global communities. Most of these chapters look at the most common issue in social justice, that of socioeconomic disparity. Chapter Six (McLoughlin) touches on engagement with community colleges, and Chapter Seven (Strutz, Orr, and Ohland) focuses on low socioeconomic status individuals directly. In both instances, these groups are overlooked or (as the authors of Chapter Seven note) are functionally "invisible minorities in engineering".

Overall, this book has a number of valuable lessons that we at Rose-Hulman should seek to apply. We are fortunate to attract top talent from across the country, both at the faculty level and the student level. We cannot forget, however, to remain mindful that neither of these categories are representative of the majority of the country, or the global community. Failure to do so will not benefit either our teaching or our students' future careers.

The "Very Next Action" Technique

Procrastination hits everyone now and again (grading, anyone?). Meggin McIntosh, host of last year's workshop Hunks, Chunks, and Bites, recommends applying the "Very Next Action" technique to those things we've been procrastinating. Not surprisingly, this approach centers on the smallest possible actionable item. Think *print out draft*, *schedule meeting with self*, *call Tracy at Local U.*, *determine menu for group lunch*. Whatever it is, identifying the very next step has a way of kicking us off our procrastination tushies and into forward motion. Once you call Tracy, you'll be raring to take on the next action. Try it!

From the Pages of Inside Higher Education

Talking Trump in the Classroom
A provocative piece about handling the intersection of current events and class material. The response to the essay in the comments are even more thought provoking. See what you think.

Success on the Tenure-Track
Although pitched at R1 faculty, the seven recommendations are reasonable. RHIT doesn't do external reviews, but it would be good practice to develop internal relationships. Ask for guidance!

First Generation Scholar
Essayist Herb Childress describes what happens when a first generation college student turns into a faculty member. His insights are a useful reminder of the varied paths to the professoriate.

Faculty Profile: Mike Buffalo Hewner

For this edition of Faculty Profile, I sat down with Mike "Buffalo" Hewner of Computer Science and Software Engineering to talk specifically about his experience with a joint teaching/Ventures experience he managed last summer. The project combined the database class with half-time Ventures jobs for eight students (working on contract for two different companies), for which Mike served as a technical consultant.

On deciding to work with Ventures: Mike's interest in the project stemmed from wanting to somehow get rising sophomores relevant experience to increase their chances for internships later on. "Not many companies want to take the risk on freshmen or sophomores, unless they have some experience" he noted. Further, in Mike's opinion, early work experience of any kind is beneficial in later learning settings, since students can think back to how they observed industry to work. The class/work combo idea emerged from Ventures, allowing eight participants with half-time work experience, rather than four students with full-time work experience. Mike noted, "There's a big difference between no work and some work" and this strategy increased the number of students experiencing "some work".

On the student experience: Mike noted that the overall experience had costs and benefits for the students. Students did pay for the database course, but their Ventures pay offset that expense, and the major benefit was experience acquisition. Motivation differed among the students regarding their primary purpose – taking the class or getting the work experience. Given Mike's background in various development shops, he characterized the experience as "not too different from normal software engineering work" and "they were basically a junior development team". The students understood the importance of the internship experience they got. Further student perspectives were captured in focus group interviews to guide future similar programs.

On the faculty experience: Mike described the experience as "100% successful – one client was ecstatic, the other pleased, especially since the projects came in under budget". Beyond the course aspect, Mike met daily with the two development teams to review their approach and provide the voice of reason and risk management. "As an experiment, all signs are positive" in Mike's estimation. The project was successful and pleasurable enough that Mike is entertaining an expansion of the opportunity.

On sticking points with the model: Mike explained that Ventures did the hard work of finding the right two clients with projects on an appropriate scale. Mike noted that the financial model of the entire project was tricky to figure out and might be hard to replicate. He noted "Pitching to clients an unknown amount of time of faculty consultation can be a problem" but he is thinking about a shared risk model among a small group of clients.

About Mike: Mike brings to Rose-Hulman varied experiences in both academia and industry. Mike earned his M.S. at UIUC in Computer Science and his Ph.D. at Georgia Tech in Human-Centered Computing, focusing on computer science education. He also holds a higher education teaching certification from Georgia Tech. Mike was a developer at Amazon for several years, and completed consulting gigs with Zipper Interactive (gaming), Groupon, and Indigo Bioautomation. He's taught at UW, Duke, Indian Institute of Technology, and in the Georgia Governor's Honors Program (high school summer enrichment). Mike's research centers on exploring decision making by undergraduates.

Handbook of Research on Educational Communications and Tech

Long title, long book. The handbook (4th edition, published 2014, Springer) is the compendium for all matters ed tech and communications related. With chapters ranging from "Instructional Design Models" to "Ethics of Educational Technology" to "Program and Project Evaluation" to "Multimedia Instruction", this handbook has guidance relevant to nearly any educationally relevant scenario. Each peer-reviewed chapter (all 74 of them!) includes theory, practical applications, and copious references. Best of all, this 1005 page tome is available for free AND downloadable via the Logan Library's collection (see the record here). See also the Handbook on Student Engagement. Thanks to Bernadette and her staff for keeping these works available.

An Introduction to Grit

Guest Article by Sarah Forbes, IRPA

Is talent the most important indicator of future success? After years of studying successful people (think West Point cadets, national spelling bee contestants, professional athletes, CEOs), Angela Duckworth concludes that *grit*, not talent, is the best indicator of future success. What is grit? Grit is the effort and perseverance you put forth toward a long-term goal you are passionate about. She asserts that not only is talent insufficient for success, but that effort counts twice. When we take our talent and put forth effort, we begin to develop skills. Those skills combined with additional effort lead to achievement. So, how gritty are you? See for yourself at the Grit Scale.

Were you happy with your score? The good news is that grit can be learned. Duckworth suggests that *interest*, *practice*, *purpose*, and *hope* are intrinsic ways to cultivate grit. Performance thrives when we have *interest*, so taking time to interact with our world to determine our interests will help fuel the passion necessary for grit. Deliberate *practice* is essential for achievement. Feedback from others and personal reflection can aid in identifying areas of weakness. Having a *purpose*, a calling that goes beyond ourselves and helps the greater good of society, gives us a reason to persevere. *Hope* is not simply wishful thinking for a better tomorrow, but rather knowing that our effort can bring about a better future. We can cultivate hope through language and actions that support a growth mindset. We can also learn to be gritty by placing ourselves in gritty environments. Extracurricular activities (or even our professional work) provide an opportunity for individuals to persist at an activity for multiple years, developing grit along the way. As humans, we want to fit in with our surroundings, so surrounding ourselves with gritty people helps us to become grittier as we seek to conform. Duckworth does acknowledge that as important as grit is, it is only one component in our character. Further, while grit is worth pursuing, it is a trade-off; time spent towards a long-term goal is time not spent elsewhere.

To read more about grit, check out the work of Angela Duckworth.

Duckworth, A. L., Peterson, C., Matthew, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087 – 1101.

Duckworth, A. L., & Yeager, D. S. (2015). Measurement matters: Assessing personal qualities other than cognitive ability for educational purposes. Educational Researcher, 44(4), 237-251.

Duckworth, A. (2016). *Grit: The power of passion and perseverance*. New York: Simon & Schuster, Inc.

Entertaining Opposing Viewpoints

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“It is the mark of an educated mind to be able to entertain a thought without accepting it.” – Aristotle

“Education is the ability to listen to almost anything without losing your temper or your self-confidence.” – Robert Frost

From Aristotle and Frost’s point of view, are we providing students with an education? Are we giving them the opportunity to discuss issues of disagreement and controversy? Or are we sheltering our students from hearing opinions and the supporting evidence that might make them feel uncomfortable and possibly moderate or change their positions? If we are doing the latter, we are also sheltering them from learning how to articulate and defend their positions with those who may disagree, as well as from examining and questioning their own positions. In other words, we are sheltering them from critical thinking – a particularly dangerous strategy in today’s politically and religiously polarized social environment.

So, rather than give students trigger warnings before a presentation or discussion on a potentially controversial or sensitive topics, give them Aristotle’s and Robert Frost’s quotes and their implications for students’ college education and development as human beings. This approach transcends censorship, speech codes, and First Amendment rights.

Submitted by Linda Nilson, author of Specifications Grading, Creating Self-Regulated Learners, Teaching at Its Best, and The Graphic Syllabus and the Outcomes Map. Linda is the retired director of Clemson’s Office of Teaching Effective and Innovation. Linda gave the CPSE spring workshop “Creating Self-Regulated Learners” in 2015. See a bibliography of Linda’s work here.

Human-Robot Collaboration Learning Community

Guest Article by Carlotta Berry, EE

During the Summer 2016 Innovation Workshop a group of faculty from various disciplines (CSSE, ME, ECE, HSS, BE) was formed to study the intersection of Artificial Intelligence (AI), Robotics, and Big Data. The product of this 8 week research/ reading group was the creation of a learning community on Human-Robot Collaboration. The learning community has now been meeting for two quarters and has added students from electrical, computer, and mechanical engineering to the team. Some of the activities undertaken include reading relevant research literature, conducting research to create a minimum viable product to measure human intent, and applying for the IBM Watson AI XPRIZE Competition. The XPRIZE "is a $5 million AI and cognitive computing competition challenging teams globally to develop and demonstrate how humans can collaborate with powerful AI technologies to tackle the world's grand challenges" ().

The long-term goal of this project is to allow a human and robot arm to seamlessly collaborate to achieve a task such as putting objects in boxes, tying a knot, soldering PCBs, assembling IKEA furniture, or building LEGO® models in response to human gestures or oral commands. One of the keys to enabling this level of collaboration is being able to detect human action and determine human intent.

The unifying topic of this group is the collaboration between a human and a physical robot within a shared space. This topic is particularly important at the moment for two major technical reasons. First, we are witnessing the migration of robots from working alone behind cages in factories to safely working in the same space as people, both in manufacturing and in social settings. These new robots have been made possible by improvements and cost reductions in sensing technologies like cameras, force sensors, and speech understanding. The second major reason is improvements in artificial intelligence and big data, which are enabling robots to make decisions based on the mountains of data created by all the new sensors.

The major challenge we are currently attempting to solve is to identify a framing for our problem, testing, and results such that they are transferrable to other organizations. This framing will involve creating a test suite so that any relevant results can be replicated in software.

Editor's Note: The Human-Robot Collaboration was supported by a $500 contribution from the CPSE. If you have a learning community you'd like to establish, see Ella for funding opportunities.

Websites of Interest

Headline Analyzer

The Advanced Marketing Institute will tell you the emotional marketing value of your headline or title and indicate its intellectual, empathetic, and spiritual qualities. Hello, ASEE conference paper title.

Visual Thesaurus

An intriguing tool to explore words and their relationships. A (nominal) subscription is required for repeated use. Recommended by Sarah Forbes, and you know she doesn't recommend lightly!

Fulbright U.S. Scholar Program

Kathy Hammett alerted faculty to the updated Fulbright program. If you envision a sabbatical or leave in 2018/19, start now! Webinars (upcoming and archived) available for application support.

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.

The Observation Exchange is ongoing. Take the opportunity to see how your colleagues in other departments do what they do. 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.