

NORTHWESTERN CENTER FOR ENGINEERING EDUCATION RESEARCH

Newsletter No. 9

June 16, 2016

News

- Two NCEER Fellows were honored with 2016 University Teaching Awards. **Elizabeth M. Gerber** received a Charles Deering McCormick Professor of Teaching Excellence award and **David W. Gatchell** received the Charles Deering McCormick Distinguished Clinical Professor award. Congratulations to Liz and David!
- A new director of the Searle Center for Advancing Learning and Teaching has been appointed. **Bennett Goldberg** will be starting this fall as assistant provost for learning and teaching, director of Searle and professor of physics and astronomy at Northwestern University. Bennett has been working at Boston University as the director of STEM Education Initiatives and a professor in physics, electrical and computer engineering, biomedical engineering, and education, where he has been influential in increasing evidence-based and active-learning in STEM instruction.
<https://shar.es/1JQrhU>
- This year's NCEER seminars sparked some great discussions on STEM teaching and learning, advising, and ethics. A few of these sessions are highlighted in this newsletter. A huge thanks to all of our presenters and panelists this year for making these discussions a success! Next academic year will have additional NCEER discussions on evidence-based instructional practices used to improve undergraduate engineering education and a revival of the McCormick Insight Faculty Workshops.

Best Practices in Undergraduate Advising Seminar

NCEER and the McCormick Undergraduate Office co-hosted a discussion about Best Practices in Undergraduate Advising last fall. The freshman advisers shared their advising practices and the new initiatives they have started. Following that a panel of advisers from other departments were available to answer questions and share best practices from their departments.

The Freshman Advising Model

In case you haven't met them yet, the Freshman advising team is Emma DeCosta, Richard Freeman, Ken Gentry, and Janice Mejia. You can find out more about them at:

<http://www.mccormick.northwestern.edu/students/undergraduate/first-year/welcome-new-students.html#first>

The McCormick Freshman advisers use Kramer's "Advising as Teaching" model [Kramer (2003), Faculty advising examined: Enhancing the potential of college faculty as advisers.] which involves

1. Engaging the student
2. Providing personal meaning to the students' academic goals
3. Collaborating with others or using the full range of institutional resources
4. Sharing, giving and taking responsibility
5. Connecting academic interests with personal interests
6. Stimulating and supporting student academic and career planning
7. Promoting intellectual and personal growth and success
8. Assessing, evaluating or tracking student progress, and
9. Establishing rapport with students.

The advisers use a combination of phone, Skype, and electronic communication, starting as early as June to reach out to and support incoming students. Entering students fill out a *Dossier* in the McCormick Advising System (MAS), an electronic advising platform available to all McCormick advisers, to indicate their interests in various majors, minors, certificates, co-op, study abroad, and research opportunities. Students also fill out reflections about their learning styles. The Freshman advisers use the info in *Dossier* to help direct students to various resources on campus, such as McCormick's Undergraduate Engineering office, the Division of Student Affairs, New Student and Family Programs, and faculty and staff in all of the engineering departments. The Dossier is also available to upperclass departmental advisers

A number of new initiatives have been started by the Freshman Advisers. One is the First Year Experience seminars, held regularly in the Fall and Winter quarters to provide new students with the support needed to adjust to college life, set healthy expectations for campus involvement and extracurricular activities, and select majors.

To learn more about the freshman advising initiatives, please visit the welcome page for incoming freshmen:

<http://www.mccormick.northwestern.edu/students/undergraduate/first-year/your-first-year.html>

Conversations about Mastery Learning Seminar

Mastery learning is an instructional and learning strategy in which students are expected to master, at some level, one set of concepts or block of material before progressing to another topic, or at least before being evaluated on a subsequent topic. The goal is to ensure that all students completing a course have a reasonable degree of competence, and provide encouragement to learn the material well. Panelists Christopher Riesbeck (EECS) and Seth Lichter (ME) spoke about their own classroom experiences with mastery learning.

How did panelists make mastery learning work in their classrooms?

There are many challenges to organizing a course to make mastery learning successful. The expectations of the assignment or exam where mastery is demonstrated as well as the process for grading and providing feedback should be clear to students. Christopher Riesbeck uses his “Do-Review-Redo” method in his EECS 325 and 394 courses. On the algorithms or codes submitted by students he uses critiques that point out areas of concern rather than grading or correcting portions of the problem where students have gone awry. This allows students to reflect upon their work before resubmitting assignments.

As for grading, the learning objectives should be written such that students (and faculty) understand what is to be mastered and at what level of Bloom’s taxonomy. Students in Seth Lichter’s EA3 course had to master five of seven learning objectives by the end of the course. Evening sessions were available for students to retake a topic up to three times. In Christopher Riesbeck’s courses grades are based on the number of tasks completed, the effort based on the number of submissions, and the quality of the work. This grading method accommodates novices through experts. For instance, a student coming in with a high level of background knowledge would be expected to get deeper or further into a problem that a lower level student who is trying to master the basics.

Ethics Training in Social Responsibilities for STEM Researchers Seminar

Dr. Mark Bourgeois, who is now at the John J. Reilly Center for Science, Technology, and Values at Notre Dame University, presented his research on ethics training for graduate student researchers. According to their website, the Reilly Center “explores conceptual, ethical, and policy issues where science and technology intersect with society from different disciplinary perspectives. Our purpose is to promote the advancement of science and technology for the common good.”

Most universities are requiring some form of ethical training for student researchers. Mark explained that “reactive ethics” training, like Responsible Conduct of Research, often comes about as a result of agencies reacting to ethical scandals, and institutions, in turn, reacting to the mandates of the agencies.

Most of these programs offer instruction on how to do science honestly. What is missing from this instruction is having students reflect on the impact that their research may have on society.

At Notre Dame, Mark is part of an NSF sponsored Ethics Education for Scientists and Engineers (EASE) project to provide in-depth ethics education to doctoral science students. Mark's team is using a Virtue Ethics philosophy that encourages students to understand the context (social, political, financial, geographic, etc.), uncover and reflect on the impacts of the research, engage others (such as stakeholders), and adapt the research in response to reflections on the impacts.

You can read more about the project at the Reilly Center research webpage:

<http://reilly.nd.edu/research/nsf-ease-grant/>

Northwestern at the ASEE 2016 Annual Meeting in New Orleans

This year there are thirteen coauthors from Northwestern who will be making presentations at the 2016 American Society of Engineering Education Annual Conference and International Forum. In addition, Arthur Felse is the Program Chair, Chemical engineering division, responsible for organizing the program and social events for the chemical engineering division.

Developing Innovative Interdisciplinary Biomedical Engineering Programs in Nigeria: Lessons Learned

Authors: David Gatchell, Robert Linsenmeier, Matthew Glucksberg, Robert Murphy, Akinwale Oladotun Coker, and Akinniyi Osuntoki

2016 ASEE International Forum Program, Concurrent Paper Tracks Session I - Curriculum
Sat. June 25, 2016 10:15 AM to 11:45 AM, Room 264, Convention Center

Staying In or Getting Out: The Relationship Between Undergraduate Work Exposure and Job Satisfaction After Graduation

Authors: Alexandra Vinson and Reed Stevens

Session M534A: Mon. June 27, 2016 3:00 PM to 4:30 PM, Room 261, Convention Center

Institutional Obstacles to Ethnographic Observation in Engineering Industry

Authors: Reed Stevens and Alexandra Vinson

Session M714B: Mon. June 27, 2016 7:00 PM to 8:30 PM, Room 272, Convention Center

Changing the Advising Model

Authors: Richard Freeman, Ken Gentry, and Jenna Goldberg

Poster Session T627B: Tue. June 28, 2016 4:45 PM to 6:15 PM, Room 357, Convention Center

Exploring Interdisciplinary Design in Relation to Workplace Success and Campus Community

Authors: Lisa Del Torto, Bruce Ankenman, Stacy Benjamin, Trevor Harty, and Penny Hirsch

Session W113: Wed. June 29, 2016 8:00 AM to 9:30 AM, Room 347, Convention Center

If you are going to the conference, stop by to check these presentations out! If you are going to the ASEE conference, and have not been invited to the NU Dinner on Sunday, please contact Jennifer.

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