

NORTHWESTERN CENTER FOR ENGINEERING EDUCATION RESEARCH

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News

- Professor Michael Peshkin (Mechanical Engineering) received the 2017 Ralph Coats Roe Award at the American Society of Engineering Education's (ASEE) annual conference. The award is in recognition of Mike's outstanding teaching as well as his notable contributions to the profession, including, but not limited to, ME 233 "Electronics Design" where students practice designing and debugging within real electronic design challenges, GEN ENG 295 "Makerskills" the first "maker" course for freshmen, and his innovative [Lightboard](#), a glass chalkboard used in recording lectures.
- Dr. Casey Ankeny, who became an Assistant Professor of Instruction in Biomedical Engineering in August, received the 2017 Biomedical Engineering Teaching Award from ASEE's Biomedical Engineering Division. Casey won the award for her work at Arizona State where she was a lecturer in biomedical engineering. She was engaged in several projects in engineering education research, including work on faculty communities of practice, flipped courses, concept mapping, and student reflection. She hopes to continue education research here and will also be in charge of the BME Master's program.
- In October, Professor Ken Forbus chaired the 2017 **Conference on the Impact of Pen and Touch Technology in Education (CPTTE)**. The purpose was to discuss the novel interfaces and applications that are being developed in the space of pen and touch technology, and the successes, the failures and the challenges faced in deploying such technology (software or hardware) in educational environments. Applications of ink-based computing – such as those from current tablet devices – have demonstrated advantages over traditional keyboard/mouse interfaces for promoting student learning and effective educational practice. These applications motivate a new landscape, in which such interfaces will alter the use of technology and enable more effective collaboration and learning experiences. The [program from the conference](#) has links to a number of the papers from the conference.

INSIGHT IX Workshop



Continuing the tradition of McCormick workshops exploring topics in learning & teaching established by Dean Steve Carr, Insight Workshop IX was held on the morning of March 17th. The theme of this year's workshop was Student Teams and Teamwork. There were several presentations from Northwestern colleagues and an invited talk by Dr. Patricia Sheridan, from the Institute for Leadership Education in Engineering at the University of Toronto, who investigates teamwork in engineering.

Patricia presented findings from her research on how students think about teamwork and the impact that has on creating effective teams. Her research showed how students entering into teamwork environments with attitudes of "I can do this without you," "We don't really need to meet in person," and "I don't have to talk to you between meetings" had a negative impact on team success. In a world where so much digital media (like Skype, GroupMe, email, and text) can facilitate meetings, students are more resistant to meeting face-to-face. Her research hypothesizes that students need help in distinguishing "together" and "apart" work better and they need coaching on how to have effective face-to-face meetings.

Several faculty presented in small groups on how they utilize teams and teaming in their courses. Gail Berger (IEMS, MEM, MBP at Northwestern) presented on teamwork myths and metrics of team success. Adam Goodman (Center for Leadership, Northwestern) presented on how to grade teams and discussed how the Center for Leadership can assist faculty in evaluating teamwork.

Insight X will be held (tentatively) on March 23, 2018, the last day of finals in Winter quarter. Save the date!

NCEER Seminars:

Insights from Early Career Engineers in the Workplace and Implications for Engineering Education

Alexandra Vinson, Postdoctoral fellow, SESP

Penny Hirsch, Professor of Instruction, Writing Program, WCAS, Segal Design Institute

On March 1, 2017, Alex and Penny shared their findings from research that they presented at ASEE in June, 2016.

Alex worked with the Learning Ethnographies of New Engineers Project led by Professor Reed Stevens at SESP and has been exploring the school-to-work transition of early career engineers at five different sites. In her paper “Staying in or getting out” Alex investigated the factors leading engineering graduates to persist in or leave engineering professions. Research participants reflected on three aspects of “fit”: personal fit, intellectual fit, and career values fit, in current and prior undergraduate work experiences such as co-op or internships. The role of undergraduate work experience was highlighted as important. As an intern, students can try on different jobs and reflect on the experiences, the fit, and future employment decisions. There is great value in both multiple internships at a single company (it may lead to a job offer) and in multiple internships at multiple companies (it may allow students to better reflect on fit and desirable future employment.) Alex is now an assistant professor of sociology at Emory University.

Penny presented on findings from a Segal Design study that looked at the impact of Segal's design certificate program and Design for America on engineering students and recent graduates. The study was intended to find the extent to which these interdisciplinary design programs help prepare students for the workplace and whether these activities support Northwestern's goal of developing community. Through surveys of students and alumni and interviews with faculty and alumni the authors identified five benefits of design work:

1. Learning the iterative design process and applying it to complex, not well-defined problems;
2. Experiencing and overcoming failure, gaining resilience and humility;
3. Improving business and team communication skills;
4. Developing team skills as a result of working with people of diverse backgrounds; and
5. Connecting engineering theory to hands-on experience through prototyping.

A discussion of the implication of this research on engineering education, especially as related to the Design Thinking and Communications courses followed the talk. More details can be found in the following 2016 ASEE conference proceedings.

Del Torto, L. M., & Ankenman, B., & Benjamin, S., & Harty, T., & Hirsch, P. L. (2016, June), Exploring Interdisciplinary Design in Relation to Workplace Success and Campus Community Paper presented at 2016 ASEE Annual Conference & Exposition, New Orleans, Louisiana. 10.18260/p.26849

Vinson, A., & Stevens, R. (2016, June), Staying In or Getting Out: The Relationship Between Undergraduate Work Exposure and Job Satisfaction After Graduation Paper presented at 2016 ASEE Annual Conference & Exposition, New Orleans, Louisiana. 10.18260/p.25867

Implementing an Instructional Grant Program for Faculty Teams: Successes and Lessons Learned

Geoffrey Herman, Research Assistant Professor, Department of Curriculum and Instruction and Teaching Assistant Professor, Department of Computer Science

University of Illinois at Urbana-Champaign



Geoffrey talked about a program in the College of Engineering at UIUC called the Strategic Instructional Initiatives Program (SIIP) that was initiated in 2012. SIIP aims to transform and revitalize core engineering courses by creating collaborative teaching cultures. In this program, a group of faculty propose an innovation, and then work as a team mentored by a Faculty Innovation Fellow, who are regular engineering faculty who have innovated in education previously. The whole project is under the guidance of the Academy of Excellence in Engineering Education (AE3), directed by Laura Hahn. You can read about some of their great ideas [here](#). Geoffrey also made us aware of an advanced online testing system being developed at UIUC that allows students to take exams outside the classroom and get rapid feedback. The impact has been to make grading less of a chore, and has prompted faculty to be more creative with examinations, often giving more examinations per semester to keep students more on track.

Northwestern at ASEE 2017 Annual Meeting in Columbus, OH

This year there were **ten** coauthors from Northwestern who made presentations at the 2017 American Society of Engineering Education Annual Conference!

Papers:

Davis, P., & **Vinson, A.**, & **Stevens, R.** (2017, June), Informal Mentorship of New Engineers in the Workplace Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28527>

Frow, E. K., & Smith, B. S., & **Ankeny, C. J.** (2017, June), Freshman Design Course: Device Design for Low-Resource Settings Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28387>

Judson, E., & Ross, L., & Hjelmstad, K. D., & Krause, S. J., & **Ankeny, C. J.**, & Culbertson, R. J., & Middleton, J. A. (2017, June), Examination of Implicit Gender Biases Among Engineering Faculty when Assigning Leadership, Research, and Service Roles Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28314>

Judson, E., & Ross, L., & Krause, S. J., & Middleton, J. A., & **Ankeny, C. J.**, & Culbertson, R. J., & Hjelmstad, K. D. (2017, June), An Expectancy Theory Based Instrument Assessing Relationships Between Faculty Dispositions and Use of Student-Centered Strategies- Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/27560>

Lopez, E., & Park, Y. S., & Smith, B. B., & Middleton, J. A., & Hjelmstad, K. D., & Judson, E., & Culbertson, R. J., & Chen, Y., & Ross, L., & Mayled, L. H., & Krause, S. J., & **Ankeny, C. J.** (2017, June), Work in Progress: The Impact of Faculty Development Workshops on Shifting Faculty Teaching Beliefs and Classroom Practice toward Student Centeredness Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/29184>

Ross, L., & Judson, E., & Krause, S. J., & **Ankeny, C. J.**, & Culbertson, R. J., & Hjelmstad, K. D. (2017, June), Relationships Between Engineering Faculty Beliefs and Classroom Practices Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28793>

Vinson, A., & Davis, P., & **Stevens, R.** (2017, June), Learning to Anticipate the User in Professional Engineering Work Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28616>

Vinson, A., & Davis, P., & **Stevens, R.** (2017, June), Problem Solving in Engineering Education and Professional Engineering Work Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/28756>

Poster and Postcard Sessions:

Brenna, S., & **Ankeny, C. J.**, & Caplan, M. R. (2017, June), Board # 1 :Investigation of Student Achievement and Attitude about a Flipped Classroom Using Linked Lecture Videos in Biomedical Engineering (Work in Progress) Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/27663>

DeCosta, E. T., & **Birdwell, J. A.**, & **Gentry, K.**, & **Freeman, R. W.**, & **Wolff, A. R.** (2017, June), Work in Progress: Analyzing Student Outcomes to Inform First-Year Advising Practices and Policies at Northwestern University's McCormick School of Engineering Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/29143>

Krause, S. J., & Middleton, J. A., & Hjelmstad, K. D., & Judson, E., & Culbertson, R. J., & **Ankeny, C. J.**, & Chen, Y., & Ross, L., & Mayled, L. H., & Lopez, E., & Park, Y. S., & Smith, B. B. (2017, June), Board #68 : Scaling a Faculty Professional Development Program to Multiple Disciplines through Disciplinary Communities of Practice Evolving from Evidence-Based Workshops Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/27973>

Linsenmeier, R. A., & **Woods, L.** (2017, June), Board # 10 :Educating Biomedical Engineering Graduate Students about Teaching (Work in Progress) Paper presented at 2017 ASEE Annual Conference & Exposition, Columbus, Ohio. <https://peer.asee.org/27665>

In addition, colleagues attending the annual American Society for Engineering Education meeting brought back the following useful links and information.

Teaching ethics

If you are teaching ethics in your engineering courses, take a look at the National Academy of Engineering workshop held in January 2017 about infusing ethics into the development of engineers. The paper from this conference can be found here:

<https://www.nae.edu/173211.aspx>

<https://www.nae.edu/Activities/Projects/CEES/CEESReports/InfusingEthicsReport.aspx>

James Madison University uses their Eight Key Questions (8KQ) in all of their engineering courses to ethical reasoning during decision making. See the 8KQ here:

<https://www.jmu.edu/mc/8-key-questions.shtml>

Accessible syllabus

As you are thinking about updating the syllabus for your upcoming course, consider setting a more inclusive tone and consider the diversity of the student population. The accessible syllabus project at Tulane has some good ideas to start with:

<https://accessiblesyllabus.tulane.edu/>

JTFD community of faculty project

Arizona State University has established a community of faculty involved in peer training of all engineering department faculty for the purposes of improving teaching and learning outcomes. The project is Just-In-Time-Teaching with Two-Way Formative Feedback from the Individual Faculty Level to the Disciplinary Dept (JTFD).

For more information you can contact

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Semester 1 Materials, including readings, Presentations, participant handouts, and participant exercises can be found here: <https://tinyurl.com/JTFD-Semester1Materials>

Semester 2 Materials, including readings, Presentations, participant handouts, and participant exercises can be found here: <https://tinyurl.com/JTFD-Semester2Materials>

Project Assessments: <https://tinyurl.com/JTFD-Assessments>

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