

Welcome to the inaugural newsletter of the Northwestern Center for Engineering Education Research (NCEER)! The newsletter will serve as one way to unite our diverse and distributed community of scholars who share a common purpose in engineering education research. Through this newsletter and the NCEER website, we will keep the community apprised of opportunities and ongoing work in the many facets of engineering education: learning science, assessment, learning technologies, and personal and social dimensions.

One of the roles of NCEER is to assist faculty with education research sections of grant applications. The co-directors in particular can help with this, but we can also point you to other resources. A related role of NCEER is to link Scholars to each other and make them aware of opportunities. Two of the many projects are highlighted below.

NCEER Website

The NCEER website (<http://www.nceer.northwestern.edu>) is an important resource, containing some useful tools you should be aware of:

1. A list of NCEER Scholars (faculty associates of NCEER), including their home departments and links to their web pages with full contact information. We will be updating this to reflect all current faculty, as well as NCEER Affiliates, which includes staff and students.
2. A large set of links to the engineering education centers of other institutions, as well as local NCEER-affiliated groups, and professional organizations.
3. A synopsis of a few of the major engineering education research projects at Northwestern. This list will be expanded as descriptions for known projects are generated, and new ones are undertaken. If you have a project that should be listed, let us know.

Please let us know if you have specific suggestions for content you think would be useful to have on the NCEER website.

NCEER Project Spotlight – Chris Riesbeck: Code Critic

Chris Riesbeck is Associate Professor in EECS, and was the Learning Technology thrust leader in the VaNTH Engineering Research Center. Code Critic was developed with graduate student Lin Qiu, now Assistant Professor of Computer Science at SUNY Oswego.

Code Critic – a.k.a. the “Critiquer” – is an experimental web-delivered computer program that addresses a problem most faculty have struggled with: giving valuable, individualized feedback on student written work in a time-effective fashion. Critiquer helps automate this arduous task.

It is particularly suited to computer code, and has been used extensively with JAVA and C++. But it is flexible enough to use with any text whatsoever. The beauty of Code Critic is that it uses an incremental authoring model: as you use it, you also automatically configure it for more automated re-use.

Critiquer can apply comments to texts either automatically or manually. In automatic operation, the system detects patterns where specific feedback is required, and then inserts it. For example, it can search for common programming mistakes. These patterns and their associated comments are configured by the user as individual papers are commented on, and then become part of the database. Code Critic also allows faculty to apply comments manually by storing them in a database without an associated pattern criteria. Faculty can apply any of these notes anywhere in a student text with just a few clicks. This makes the tool usable with any kind of written work, even English prose papers. When a new note is created, it is immediately added to the database for future re-use – even by other graders, such as TAs.

Code Critic has become an integral part of the pedagogy in EECS 110 and 325 because, as one student put it, “Code critic helped me to improve my code in ways that I wouldn't have [been able] to do if I just turned it in and got a grade.”

To see Code Critic for yourself, try it out at: <http://lyonesse.cs.northwestern.edu.8080/CritiquerJS/>

Professor Riesbeck would like to broaden the application of Code Critic. If you see a use for this tool in your class, or just want to know more about it, contact him at c-riesbeck@northwestern.edu. A link to the tool can be made in Blackboard.

NCEER Project Spotlight – Marina Micari, Pilar Pazos and Mitra Hartmann: Gender Differences in Undergraduate Engineering

Marina Micari is Associate Director of Undergraduate Programs at the Searle Center for Teaching Excellence. Pilar Pazos, formerly a Research Associate at Searle, is now Assistant Professor of Engineering Management at Old Dominion. Mitra Hartmann is Assistant Professor in Biomedical and Mechanical Engineering, and teaches Introductory Fluid Mechanics (BME 270 and ME 241), in which this study was performed.

In most courses of engineering study, men vastly outnumber women. This study, a collaboration between the Searle Center and engineering faculty, tried to discern whether there might be a gender difference in basic attitudes towards science and engineering; and, if so, how that difference might find expression in course experience and performance.

This study used a 20 item Likert-scale survey to gauge attitudes (such as problem-solving styles and feelings of engagement) administered in five fluid mechanics classes with four different instructors from 2004–2006. Results showed gender differences on some attitudes, but not on others.

Interestingly, some of the areas where no gender distinction was found are just those often presumed to have one: the social applicability of engineering and a collaborative working style. The most significant differences instead centered on confidence level: women showed a lower overall level of confidence in their abilities, which is consistent with other research. Nonetheless, this discrepancy did not result in a grade differential in this course. In any case, measures such as mentoring that might inspire higher confidence in all students are suggested.

The study was published in 2007 as “A matter of Confidence: Gender Differences in Attitudes Towards Engaging in Lab and Course Work in Undergraduate Engineering” in the *Journal of Women and Minorities in Science and Engineering*, 13(3), 281–295. A copy of the paper is available by request from Dr. Micari, m-micari@northwestern.edu.

If you would like to undertake an engineering education study in your class, researchers at the Searle Center can consult with you. Besides serving as a teaching resource, the Searle Center is interested in collaborating on many kinds of education research projects.

Ann McKenna, mckenna@northwestern.edu

Rob Linsenmeier, r-linsenmeier@northwestern.edu

Co-Directors, Northwestern Center for Engineering Education Research (NCEER)

Mark Bourgeois, m-bourgeois@northwestern.edu

NCEER Affiliate