

## **2015 Himmelblau Award Winners Announced**

The team of John L. Falconer, Janet deGrazia, J. Will Medlin, and Garret D. Nicodemus is the winner of the 2015 David Himmelblau Award for Innovations in Computer-Based Chemical Engineering Education. They have prepared innovative, computer-based educational aids for teaching/learning including 1,600 ConcepTests, 1,200 screencast videos, and 75 interactive Mathematica simulations. This has resulted in the development of a *novel* course package that facilitates adoption of evidence-based instructional practices (available on [www.LearnChemE.com](http://www.LearnChemE.com)). The team's work represents a comprehensive effort to provide innovative, computer-based tools to facilitate active learning in chemical engineering education at the undergraduate level. This effort has positively impacted hundreds of faculty and thousands of students, not only at CU but also at universities across the country.

ConcepTests are challenging, multiple-choice questions that focus on important concepts rather than calculations and are designed for use in class with student-held clickers facilitated by computer acquisition of student responses. The CU team started in 2002 and has prepared more than 1,600 ConcepTests for 7 courses. Combined with peer instruction, ConcepTests create an active learning environment. More than 400 faculty have received access to ConcepTests on [www.LearnChemE.com](http://www.LearnChemE.com). Many of the AIChE Concept Warehouse ConcepTests were created by the CU team.

More than 1,200 screencasts (available on [www.youtube.com/user/LearnChemE](http://www.youtube.com/user/LearnChemE), iTunesU, and [www.LearnChemE.com](http://www.LearnChemE.com)) for 11 chemical engineering courses were prepared by the CU team starting in 2009. These are short videos (<10 min long) prepared by screen capture of a tablet PC. The innovation by the CU team was to prepare short screencasts that could be used by chemical engineering students at other universities. What makes them unique among computer-based instructional materials is how much students overwhelmingly like them. Typical student feedback has included comments such as: "Screencasts are fantastic", "Screencasts are amazing", "I love screencasts!", "I think screencasts were unbelievably effective", "I think screencasts are fantastic and incredibly helpful". A second innovation by the CU team was to develop 100 interactive screencasts, where students select an answer on line and are directed to another screencast. The screencasts were *played/downloaded more than 2.4 million times in 2014, and the LearnChemE site on YouTube has more than 20,000 subscribers*. Feedback from 440 students showed that more than 95% of those students said screencasts were useful or very useful, 85% said they were better than

textbooks at improving understanding, and 92% felt more confident about material after watching screencasts. Also, workshops on screencasts presented by Falconer and Medlin were the second-highest-rated of the 23 different workshops at the 2012 ASEE Chemical Engineering Summer School.

In addition to ConcepTests and screencasts, the CU team prepared 75 interactive simulations for 4 courses using Mathematica to make visualization and understanding of chemical engineering concepts easier. These simulations solve governing equations in real time as the user changes parameters with sliders. What distinguishes these simulations from others published on the Wolfram site(<http://demonstrations.wolfram.com/>) is that they were prepared to facilitate student learning. An additional innovation was preparation of screencasts that used the simulations. These simulations have been played/downloaded almost 60,000 times already, even though the majority of them have been online for less than 9 months.