

NORTHWESTERN CENTER FOR ENGINEERING EDUCATION RESEARCH

Newsletter No. 12

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News

The biggest news items of this past year have been the pandemic, the rise of violence and the ongoing fight for social justice, and how we've responded. COVID-19 disrupted many things in 2020-2021. We rapidly changed to remote and hybrid formats for teaching. Many of us turned to the University Libraries and NUIT's Practicum in the Foundations of Online Learning course and Michael Peshkin's micro-seminar series to learn tips on how to switch over to remote platforms.

We saw how the murder of George Floyd, the fight for racial justice, and the Black Lives Matter movement were impacting how our students were learning, which led to a push by the university for a greater focus on inclusion and equity. Because of the important interactions that faculty have with their advisees, NCEER offered Inclusive Advising Workshops to discuss best practices about how we interact with our diverse student body. The materials for these were based on information from the NSF funded ASPIRE Alliance. [Their materials are available here.](#)

McCormick now has a page about [diversity, equity, and inclusion on its website](#) that faculty should be familiar with. And several McCormick departments have created their own Diversity, Equity, and Inclusion committees to address inequities and improve their campus climates.

While we are sad that we didn't get to have some of our regular programming like the INSIGHT workshop this year, we hope you have stayed safe and well, and we look forward to meeting again in the near future. If you have ideas for NCEER programming in the 2021-22 academic year, please let us know.

Upcoming events

NCEER usually holds a meeting to discuss what Northwestern attendees learned at the American Society for Engineering Education annual conference. Please contact Rob or Jennifer (emails below) if you attended the 2021 Virtual ASEE conference and would be interested in sharing what you learned.

The papers from the virtual conference are now available to the public. Here are some of the papers and presentations by Northwestern members at ASEE:

[*A Multi-level Diffusion Unit: Connecting Submicro- and Macro-levels with Computational, Graphical, and Mathematical Representations*](#)

Jacob Z. Kelter, Jonathan Daniel Emery, and Uri Wilensky

[*How We Teach: Kinetics and Reactor Design*](#)

Laura P. Ford, Janie Brennan, David L. Silverstein, Lucas James Landherr, Christy Wheeler West, Stephen W. Thiel, Kevin D. Dahm, Jennifer Cole, and Marnie V. Jamieson

[*Learning Equity in First-Year Engineering Design*](#)

Emma Tevaarwerk DeCosta, Kathleen Carmichael, Ordell Brown, Lisa Davidson, and Elise Gruneisen

[*WIP: Effectiveness of Different Reflection Approaches for Improving Mastery in an Engineering Laboratory Course*](#)

Amy N. Adkins, David P. O'Neill, and Casey Jane Ankeny

Inclusion statements in syllabi

The syllabus can set the tone for the classroom climate. Is your syllabus boilerplate, contractual information? Do you let students know that you value their contributions to the class? Do you let them know what concrete actions you will take to create a welcoming environment? An inclusion statement as part of your syllabus can signal to your students your commitment to creating an inclusive and supportive climate for all students.

A small group from the NCEER community met on the topic of adding statements regarding diversity, equity, and inclusion to McCormick course syllabi. The group offered a short document containing a few example inclusion statements that faculty can modify or use as is as well as

some links to learn more about why inclusion statements are important. [This document is now available](#) in the resources section of the NCEER website.

In case you missed it...

Here are some highlights of this past year's events.

NCEER Seminar: Ungrading / Going Gradeless

February 22, 2021

Presenter: **Chris Riesbeck**, Computer Science

In this seminar, Chris Riesbeck discussed why he sees grades as problematic, how he's approached "grading," and how his practices fit into a "grade-centric" environment like Northwestern. Referencing [Alfie Kohn's article "From Degrading to De-grading,"](#) Chris presented the main points that 1) students focus on the grade rather than the learning; 2) grading isn't always reliable and/or objective; 3) grading takes instructor time that could be spent on learning; and 4) grades can come between students and between the student and instructor. Instead of grading, Chris works on providing critiques and feedback, allowing students to resubmit work as they move towards achieving the class learning goals. Instead of grading the students' work, the course grade is based on student participation and engagement with the activities.

To learn more about Chris's methods, check out his [blog post: "20 Years Gradeless: Having My Cake and Eating It Too."](#) For more information about un-grading, see [Jesse Stommel's "How to Ungrade"](#) and [Adam Rosenblatt's "Committing to ungrading, in an emergency and after."](#)

NCEER Seminar: Using agent-based modeling to help students learn science topics from the perspective of emergence

March 15, 2021

Presenters: **Jacob Kelter**, Computer Science and Learning Science
Jonathan Emery, Materials Science and Engineering

Jacob and Jonathan presented on their work using computational agent-based modeling to explore how macro-level patterns emerge from encoded micro-level rules. In one example,

students built an agent-based model to derive Fick's laws of diffusion, connecting micro-level movement of individual molecules to the macro-scale changes in concentration profiles. This particular work was presented at the 2020 ASEE Virtual Annual Meeting. The use of agent-based models has the potential to help students learn challenging concepts in a variety of majors. For instance, the pair have also worked on a model and unit for students to learn about semiconductors.

Check out Jacob and Jonathan's 2020 ASEE paper for more information:

Kelter, J., & Emery, J. D., & Wilensky, U. (2020, June), *Learning About Diffusion at Two Levels: Agent-based Microscale and Equation-based Macroscale* Presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line. 10.18260/1-2--34897

NCEER Seminar: Imagining the Future of Undergraduate STEM Education

April 12, 2021

Presenters: **Robert Linsenmeier**, Biomedical Engineering
Jennifer Cole, Chemical and Biological Engineering

Rob and Jennifer presented some of the highlights from the National Academies virtual "Imagining the Future of Undergraduate STEM Education Symposium" held in November 2020. The Symposium focused on transforming STEM education for 2040 and beyond, bringing together a diverse set of participants, presenters, and panelists.

The Symposium had two commissioned papers. The first, "Transformation in the U.S. Higher Education System: Implications for Racial Equity" by Lindsey Malcom-Piqueux, Assistant Vice President for Diversity, Equity, Inclusion, and Assessment at Caltech, highlighted the times of historical expansion of STEM in higher education and how the policies surrounding those expansions led to inequitable outcomes for minoritized students. The paper also discussed the roles of minority serving institutions and community colleges in meeting the needs of diverse student populations. The second paper, "Current Innovations in STEM Education and Equity Needs for the Future" by Sanjay Sarma, Vice President for Open Learning, and Aikaterina Bagiati, Research Scientist at the Office of Open Learning at MIT, presented the current innovations in STEM pedagogy and how they might be implemented in a more equitable way.

This NCEER seminar highlighted these two papers and how Northwestern fits into the higher education STEM space. In a follow up discussion, participants discussed where Northwestern is

leading in educating future engineers and scientists, as well as thinking forward to how education and preparation of educators may change in the future.

This National Academies Symposium was recorded, and you can find the commissioned papers (papers 2 and 3 under meeting materials) [here](#).

Robert Linsenmeier, r-linsenmeier@northwestern.edu
NCEER Director

Jennifer Cole, jennifer-cole@northwestern.edu
NCEER Associate Director