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Research project to test innovative ways of improving math teaching

Urban Education Lab teams with 100Kin10 network, selects two partners for \$100,000 prize and year-long experimental study

Math teachers in four school districts will learn innovative ways to challenge students with engaging new lessons – and their efforts to improve student learning will be studied over the coming school year in a groundbreaking research project conducted by the University of Chicago's Urban Education Laboratory, university officials announced Thursday.

The two partners, the California State University system and Mathalicious, were selected as winners of the 100Kin10 Research Design Competition. 100Kin10 is a national movement to provide America's classrooms with 100,000 excellent science, technology, engineering and math (STEM) teachers by 2021.

Both partners will work intensely with math teachers to improve instruction around the Common Core State Standards-Mathematics. This means the findings could influence how districts nationwide improve the implementation of these new standards in coming years. Each winning partner will receive \$100,000 for its general operating funds.

"Building gold-standard evidence about how to develop the best possible STEM teachers is essential to America's future," said Tim Knowles, executive director of the Urban Education Institute, which created the Urban Education Lab, a consortium of national education researchers committed to improving education outcomes.

"Our nation's schools spend billions of dollars a year on professional development, but we still lack scientific evidence about what we're getting for all that money -- what really works to improve student learning for which teachers and under which conditions. This project is an important step forward for the network and the STEM field as a whole."

The focus on teacher support makes this research project an ideal fit — and excellent learning opportunity — for the 100Kin10 network, said Talia Milgrom-Elcott, co-leader of 100Kin10 and a program officer at Carnegie Corporation of New York. Carnegie is one of two foundations sponsoring this work.

"Our goal of 100,000 excellent STEM teachers demands that we help teachers develop new skills, so that more improve and the best ones stay," she said. "The results of these trials will yield exciting insights into how to do this well."



The two winners share a common vision, but operate in vastly different contexts.

Founded in 2009, Mathalicious is rewriting middle and high school mathematics classroom content around real-world topics. Through their website storefront, the company offers lessons and lesson guides aimed at engaging students in thinking critically about the world with mathematics. For example, exploring exponential growth by asking, "What is Moore's Law, and how closely has it predicted video game console processor speeds?" and unit rates and proportions with, "What would happen if instead of calories, McDonald's displayed its menu items in terms of exercise?"

For this experiment, Mathalicious will partner with three Virginia school districts and randomly assign math teachers from 52 middle and high schools to either receive the "treatment" — unlimited access to Mathalicious content along with coordinated, online professional support throughout the 2013-14 school year. Control group teachers will receive the traditional professional development offered by their schools but can also access Mathalicious lessons. To measure impact, the study will consider student assessments, teachers' reported use of the provided lessons, and teacher job satisfaction.

"Mathalicious is thrilled to partner with 100Kin10 and the Urban Education Lab to study the impact of online PD in helping teachers transition to the new common standards," said Karim Ani, Mathalicious founder. "Content providers and school districts alike will gain valuable insights into supporting teachers in innovative and sustainable ways."

Jens Ludwig, a University of Chicago professor known for his groundbreaking work around crime, poverty and education, will help guide the research as co-director of the Urban Education Lab.

"We know that 'if you build it they will come' doesn't necessarily apply for most teacher support efforts," Ludwig said. "The Mathalicious proposal attempts to connect what is known about high quality professional development with strong online supports and address the motivational issues associated with getting teachers to make use of high-quality instructional materials and actually change their practice."

In California, a team from CSU-Long Beach will partner with an urban school district near the campus to deliver on a far more time-tested teaching improvement tool – Lesson Study. Developed in Japan, Lesson Study has become increasingly popular in U.S. schools and teacher training programs as an effective way to integrate professional learning with the daily responsibilities and practices of teachers. Teams of teachers collaborate, plan, teach, observe and critique a lesson. CSU's innovation is to build this process around the implementation of common core math standards in grades 2 to 5 for a diverse district with a high population of English Language Learners.

"We're pleased to support an effort that will not only benefit teachers in this one district, but has the potential to shape how elementary teachers develop throughout their careers, with a particular focus on common core math standards," said Julie Kidd, program officer at the S. D. Bechtel, Jr. Foundation, a 100Kin10 funder that co-sponsored the research competition and inspired a specific focus on K-8 STEM educators.



In the CSU study, a randomly chosen group of 30 teachers will participate in five lesson study cycles over five months in 2013-14. They will be compared to a control group of 30 non-participating teachers using a range of measures covering teacher practice, teacher and student attitudes, student outcomes and engagement.

CSU proposed the project because of its potential to provide compelling evidence about a professional development practice that will equip teachers to deal with the complexity of common core standards, said Beverly Young, CSU's Assistant Vice Chancellor for Academic Affairs. CSU joined the 100Kin10 movement in 2012 as the nation's largest producer of math and science teachers, pledging to prepare more than 1,500 teachers in these fields annually.

"The process of lesson study allows teachers to deconstruct these standards, dissect their own instruction, learn how to share and reflect, and develop lessons and strategies that can be exported elsewhere," Young said. "We're focusing on elementary teachers because this is going to be an exceptionally heavy lift for them ... mastering markedly more demanding content and a deep understanding of mathematical concepts."

Kirabo Jackson, a labor economist and assistant professor at Northwestern University, will lead the team of UEL researchers as part of the year-long study. He said both winning proposals feature strong interventions with the potential to produce positive outcomes and shape future research projects. He said the UEL team will work with partners to explore which particular practices — or which components of the Lesson Study or Mathalicious support — are most effective and why.

Updates on the project will continue throughout the year, with a final report to be released next fall.

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