

# ForwardED

The latest news from the  
Wisconsin Center for Education Research  
UW–Madison School of Education  
FALL 2018

P R E - K T H R O U G H H I G H E R E D U C A T I O N

## Making Sense of Big Data

*WCER researcher helps decipher human behavior*

It happens with every credit-card swipe and GPS ping. It's part of writing an email, sending a text or posting on Instagram. It can be triggered by playing an online game, ordering dinner on a smartphone or surfing for best buys on a tablet. Even showing up on security footage while shopping will do it.

Active or passive, all these activities leave a digital record that moment by moment is driving the largest collection of information ever accumulated. According to Google CEO Eric Schmidt, the information being generated online every two days equals the total amount recorded in all of human history prior to 2003, with a growth rate doubling biennially.

That information represents a bonanza of potential new insights for those who study human behavior.

But even as technological advances speed this data explosion, making sense of what's being gathered grows more difficult, notes UW–Madison scholar David Williamson Shaffer, the Vilas Distinguished Achievement Professor of Learning Sciences.

So Shaffer is offering researchers a new way to help find meaning in the digital clamor.

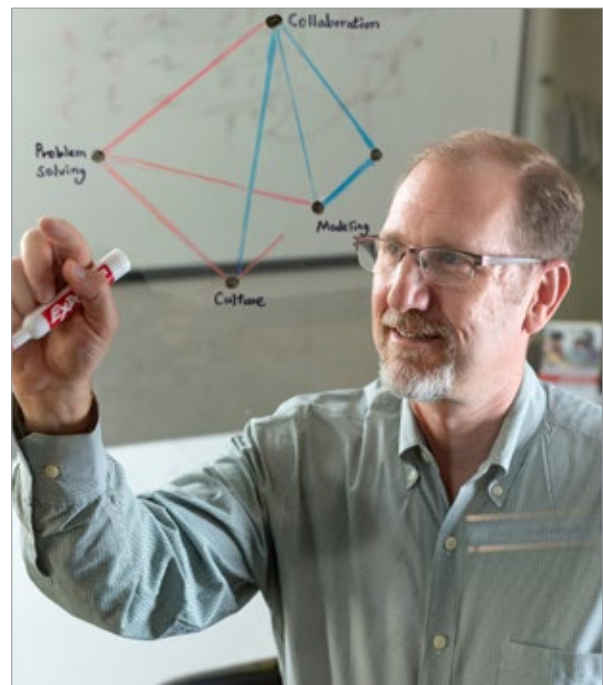
He and his team at WCER's Epistemic Analytics Lab have developed a first-of-its-kind research method for the study of culture and human behavior that blends the two main types of data analysis used by researchers—quantitative and qualitative—to reveal uniquely rich, real-time results with the validity of a statistically sound random sample. He calls the new method quantitative ethnography (QE).

"Our tools let researchers look in more depth at their data," Shaffer says.

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*UW–Madison professor of learning sciences David Williamson Shaffer is offering researchers a new way to find meaningful connections in the growing clamor of big data.*

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## WHY IT MATTERS

Getting the meaning wrong matters, especially as big data is used increasingly in automated, impersonal ways that can negatively impact lives.

“Computer algorithms screen job applicants, determine whether prisoners will be granted parole, evaluate the work of teachers and influence a host of other decisions that used to be made by human beings,” says Shaffer, who also is a data philosopher in the UW–Madison School of Education’s Wisconsin Center for Education Research.

Shaffer’s 2017 book “Quantitative Ethnography” is a formal introduction to this new way of analyzing data. The approach has been in development for the past decade by Shaffer and key collaborators at Arizona State University, Michigan State University, the University of Memphis, Aalborg University in Denmark and the University of Edinburgh in Scotland.

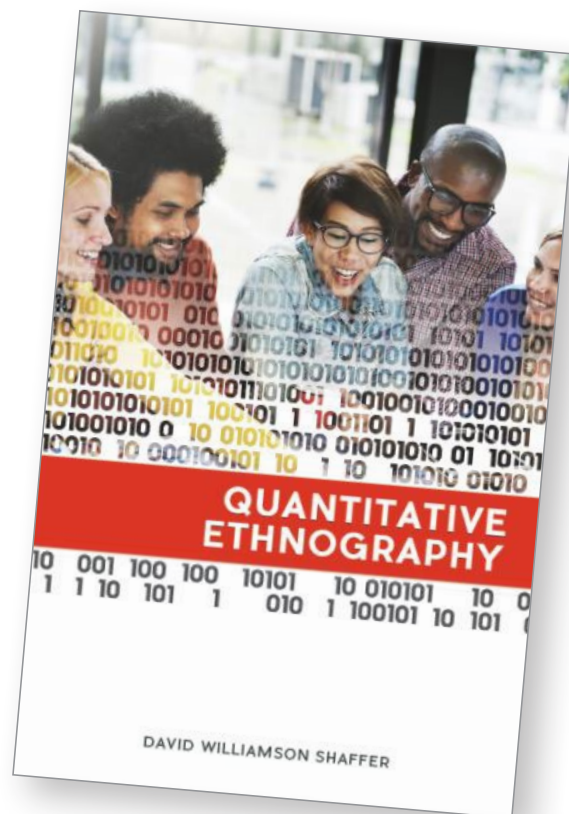
But the tools of QE have traveled beyond that extended circle. The Epistemic Analytics Lab supports over 250 researchers, with more than 80 ongoing collaborations between Shaffer’s lab and researchers at more than 50 institutions in 16 countries.

Developed through research grants from the National Science Foundation, QE is especially well-suited to analyzing complex, collaborative thinking. Because of that, Shaffer sees big potential for QE to be adopted more widely, as teamwork and collaboration become more important in education and the workforce, but require new methods—such as QE—to be better analyzed.

The name “quantitative ethnography” reflects the approach’s blend of data methods: ethnography is the qualitative study of culture, plus statistics to analyze culture in big data.

Shaffer’s goal was to create a way to look at conclusions drawn from a small sample of “thick data”—what people say or do as captured in interviews, field notes, focus groups or video—and use statistical techniques to see whether those conclusions apply to a larger set of data.

“It’s a different way of thinking about your work,” says Aroutis Foster, a professor of learning technologies at Drexel University in Philadelphia, Pennsylvania, who has used QE. “To me, it’s a method that allows you to think of (qualitative data) in a whole different way—how can we segment and quantify it? It’s a methodology that’s pretty flexible.”



Already, QE has been used to analyze data for topics as varied as surgical education, a global after-school program to support STEM learning, communication patterns among successful students in large, online classes in Europe and Australia, and simulation-based training of U.S. Naval teams responsible for detecting missile threats.

Shaffer wants to share the approach with other researchers, including the tools his lab has developed to implement the ideas of QE, available free at [epistemicnetwork.org](http://epistemicnetwork.org).

“The term ‘epistemic’ is important,” Shaffer says, “because epistemology is the study of how we know what we know—that is, how we make meaning of things.”

His team at the Epistemic Analytics Lab also helps QE adopters through the basic set-up, and with adapting the methods for fields beyond education.

“At the core, anybody who has interview data, who has field notes from their research, who’s looking at Twitter or Facebook, or blogs at scale, anybody who is analyzing the mountains of big data that are recorded every day,” Shaffer says, “can use our tools to get insight into their data and support the claims they are making.”

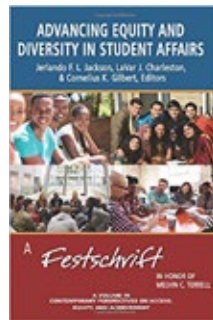
# Publications/Findings From WCER Researchers

The Wisconsin Center for Education Research impacts education in Wisconsin and nationwide. Here are the latest findings from WCER researchers:

## DIVERSITY

### “Advancing Equity and Diversity in Student Affairs: A Festschrift in Honor of Melvin C. Terrell”

Lead-edited by professor Jerlando F. L. Jackson, this book highlights how student affairs has grown as a field of practice in response to the growth of student diversity on college campuses. Featuring contributions from past staff members of Wisconsin’s Equity and Inclusion Laboratory (Wei LAB), this work honors the remarkable career of Melvin C. Terrell, a pioneer in the field of student affairs.



## LABOR MARKET

### “Cultural Capital at Work: How Cognitive and Noncognitive Skills are Taught, Trained and Rewarded in a Chinese Technical College”

Community college student employability is a pressing concern in the U.S. and China. By studying how educators and employers view essential skills in an eastern Chinese city, Matt Hora and Chelsea Blackburn Cohen reveal that “soft skills” should accompany technical expertise; pedagogy in Chinese colleges is counter-productive to this goal; and hiring is strongly influenced by screening applicants for cultural fit. Findings indicate the need for more inquiry-based teaching, and a more nuanced and culturally informed conception of student employability.

### “Feeling the Stress and Strain: Race, Economics and the Educational Experiences of Latinx Emergent Bilinguals in a ‘New’ Destination School”

In the journal *Race Ethnicity and Education*, Bailey Smolarek examines the schooling experiences of Latinx youth classified as English Language Learners at a mid-size high school in a small Wisconsin town. Findings highlight the intersecting role of race and class in the schooling experiences of this growing population. Smolarek argues for more culturally responsive staff, as well as more funding, time, resources, support and attention to improve educational experiences of Latinx students.



### “Skilled Non-College Occupations in the U.S.”

In this working paper, Matías D. Scaglione presents a new approach to the identification of relatively skilled occupations that do not typically require a bachelor’s degree for entry. These jobs are called Skilled Non-College Occupations (SNCOs). In contrast with studies estimating that employment in so-called middle-skill jobs represents one-third to nearly a half of total employment, this study estimates SNCOs accounted for 16.2 percent of all jobs in 2016.



## EVALUATION

### “Culturally Responsive Evaluation: A Tool for Transforming Policy and Practice”

This foundational study by Nicole Bowman-Farrell provides a historical and legal perspective on research and evaluation in tribal communities, theoretical and methodological approaches for design, and practical applications using an Indigenous evaluation framework. Published in the first-ever, all-Indigenous evaluation issue of *New Directions in Evaluation*.



## MATH

### “Keys to the Gate? Equal-Sign Knowledge at Second Grade Predicts Fourth-Grade Algebra Competence”

New research by Percival Matthews and co-researcher Lynn Fuchs, Vanderbilt University, shows the long-term impact of early equal-sign knowledge on later algebra skill. The study measured students’ equal-sign knowledge at second grade and found it predicted algebraic thinking in fourth grade more powerfully than IQ, arithmetic skill, attentive behavior or eligibility for subsidized school lunch. To improve algebra access, the focus should be on promoting equal-sign knowledge and disseminating information about its importance to educators. Published in *Child Development*.



## HIGHER EDUCATION

### “College Attendance Among Low-Income Youth: Differences Across Wisconsin High Schools”



This working paper by Noah Hirschl and Christian Michael Smith shows Wisconsin high schools vary substantially in how they facilitate four-year college attendance among economically disadvantaged students. Some, but not all, of this variation is due to geographic settings of high schools. Findings show suburban schools, Milwaukee schools and schools near a University of Wisconsin four-year institution send more economically disadvantaged students to four-year colleges.

## TEACHING PRACTICE

### “Examining Faculty Reflective Practice: A Call for Critical Awareness and Institutional Support”



In *The Journal of Higher Education*, Matt Hora and Bailey Smolarek explore how and why a group of postsecondary STEM faculty reflected on data about their teaching. Findings show faculty reflected on technical, structural and social aspects of teaching, but individual bias and structural constraints limited the outcomes. Findings suggest that university and college administrators provide more time, funding and support for faculty to reflect on teaching, discuss their views with colleagues and put observations into action.

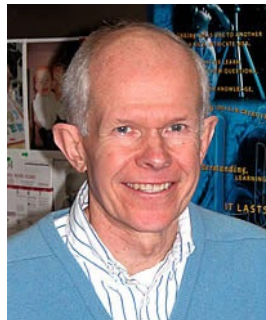
## News

### Apply for grants in the philosophy of education!

The Center for Ethics & Education at WCER is calling all researchers to apply for grants up to \$40,000 for projects related to the philosophy of education—from highly abstract to applied research. Work should center around educational policy and practice for K-12, higher education, and children’s growth and development. The deadline to apply is Nov. 6. For details, go to: [ethicsandeducation.wceruw.org/research-grants.html](http://ethicsandeducation.wceruw.org/research-grants.html).

### Tom Carpenter, pioneer of child-centered math teaching, dies

UW–Madison professor Tom Carpenter, whose student-centered ideas about teaching math to young children from all backgrounds and skill levels helped transform the field of math education, died Aug. 7 from complications of Parkinson’s disease. Although he retired in 2004, Carpenter continued to work for more than 10 years as a WCER researcher and mentored many graduate students.



### UW–Madison to improve, diversify STEM teaching with \$10 million grant

A five-year, \$10 million grant from the National Science Foundation will be led by UW–Madison’s Center for the Integration of Research, Teaching, and Learning (CIRTL) and the Association of Public and Land-grant Universities. These education partners will use the NSF INCLUDES Alliance grant to boost the success rate of underrepresented students in STEM fields.



### Robert Mathieu appointed to STEM Education Advisory Panel

Robert Mathieu, the Albert E. Whitford Professor of Astronomy at the University of Wisconsin–Madison and WCER director, has been named an inaugural member of the White House STEM Education Advisory Panel. Mathieu says in his new role he will ensure that federal funding advances scientific and technical development, and STEM education across the U.S.



For more findings, news and events, visit: [wcer.wisc.edu/news/newsletter](http://wcer.wisc.edu/news/newsletter).



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