THE UNIVERSITY OF ARIZONA
Center for University Education Scholarship

SUMMARY

Quantitative Intuition (QI) in University Learning: Consensus Guidance and New CUES Spanning Boundaries Challenge Grant

In today's world, several trends (e.g., the emergence of Big-Data science and Artificial Intelligence, enhanced digitization in the humanities, arts, and civic purpose, etc.) have made it even more important that people have an agile sense of what numbers mean and tell us, and to use them to communicate effectively. This skill, which could be termed "*Quantitative Intuition (QI)*", includes data-informed evaluation, interpretation, and communication, and is arguably an essential outcome of college learning across all disciplines.

In April 2019 a CUES workshop on QI[1] brought together several University of Arizona (UA) faculty from **law, journalism, medicine, architecture, economics, political science, public health and more**, to characterize QI, discuss its importance in university learning and teaching, and identify recommendations to foster QI teaching and learning at UA, including securing funding for transformative, sustainable QI initiatives that bridge across units and disciplines, and are of significant, lasting value to UA.

The faculty argued that QI is a critical outcome of the college experience. If so, what educational innovations and instructional practices cultivate QI? Which, if any, dampen it? And how might we, as university educators, be intentional in understanding what both general and discipline-specific QI look like, and how these might be develop, and assessed?

Further, the participants agreed that **sharpening QI among students is an interdisciplinary issue**, as a **robust QI requires integrating interdisciplinary perspectives.** In particular, QI requires more than simply STEM-related knowledge.

The group agreed that teaching practices that spark curiosity, primed by the use of meaningful questions that anticipate the more technical ones can contribute to developing QI. For example, asking "*which methodology to use in a particular case*" is more likely to promote QI, than simply teaching the application of specific methods. Research has clearly identified curiosity and questioning as mechanisms for sustaining students' attention[2,3], which suggests that strategies to bolster QI may also enhance students' engagement in learning.

The workshop report points to iterative guess work, peer critique, and peer discussion as activities that sharpen QI. In particular, "*promoting risk-free environments where students can ask questions free from judgment, but not free from critical appraisal*," seems key. This suggests that interactive, student-centered learning spaces, shown to enhance student learning in general[4], will likely also help to support QI development in university learning.

The report recommends that QI be further explored as a critical outcome of university teaching and learning, by supporting and bolstering the development of QI in our courses. This includes **creating a team-based, cross-disciplinary funding competition across the University** for developing and implementing QI-related programs.

To build on these recommendations and encourage further development, CUES will pilot a new "*QI Spanning Boundaries Challenge.*" This project-based grant aims to incentivize multidisciplinary work that enhances innovation and scholarship in QI-teaching and learning at UA. To find out more about this Challenge, or to view the 2019 QI MECha Workshop recommendations, please visit the CUES website, cues.arizona.edu.

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[1] Mapping Educational Challenges (MECha) Workshop on Quantitative Intuition (QI), cues.arizona.edu/mecha/

[2] Building Community and Keeping Students' Attention: Teaching and Learning Scholar Offers Advice to UA Faculty

[3] Lang, J. Distracted. New York: Basic Books. Forthcoming 2020.

[4] Deslauriers, L., McCarty, L., Miller, K., Callaghan, K., and Kestin. G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. PNAS. doi.org/10.1073/pnas.1821936116