**Overcoming Math Anxiety to Achieve Quantitative Literacy for Professional Success**

Quantitative literacy (QL) used in the *sensu lato* can be thought of as an umbrella term encompassing quantitative reasoning, numeracy, and quantitative literacy (*sensu stricto*). I study QL (in the umbrella sense of the term) and its interactions with geoscience education, workplace competency (for geoscientists), and citizen literacy.

I will have defended my dissertation “Framing Geological Numeracy for the Purpose of Geoscience Education: The Geoscience Quantitative Preparation Survey” by the time this workshop takes place. The dissertation attempts to determine (1) how satisfied early career geologists are with the quantitative preparation they received as undergraduates relative to their careers, and (2) how quantitatively literate they feel themselves to be relative to career demands. The work is based on a survey I developed and piloted – The Geoscience Quantitative Preparation Survey (GQPS) – which measures self-confidence in math methods and skills, asks participants whether they use those methods and skills in work and non-work settings, satisfaction in undergraduate prep for career success based on university and geoscience department coursework, and limited demographic information. The pilot results of the GQPS indicated that early career geologists were highly quantitatively literate at “citizen level” quantitative skills, sufficiently quantitatively literate for higher quantitative skills (between citizen skills but below calculus-level math) when noted that they used those skills at their jobs, and generally satisfied with the quantitative preparation they received, except as regards computers.

When I have taught or assisted in teaching QL or Quantitative Reasoning (QR) in the geoscience classroom, I have been interested in fostering the following:

* Competence with QL skills and habits of mind ranging from number sense to logarithmic thinking.
* Confidence regarding the use of this competence.
* Development of mental schemas for solving problems, especially those involving quantitative materials.
* Mitigation skills for dealing with and overcoming math anxiety and math avoidance (without shaming, ever).
* Welcoming students, regardless of past experiences with math or statistics.
* Demonstrating that they are capable, provided their affective attitude permits success.

There is no branch of the geosciences that does not include the quantitative. For those students who seek to work in the geosciences, learning how to be empowered by their own competence should be an inclusive and uplifting experience.

My past publications, demonstrations, and presentations have included QL-in-geoscience topics such as:

* Measurement of an object using an unmarked stick and continued fractions (the teaching demonstration I submitted).
* Reading and writing with popular nonfiction mathematics book to improve student attitudes about math.
* Logarithms, 3D-printed slide rules, and student-created log scales as a primer for reading and understanding common modeling functions.
* Interviews with geology alumni from a QL-in-geology class on how they used course materials after graduation and how the course changed over time.

What I hope to find out, as I continue my career, includes:

* How can departments outside of mathematics (like geosciences) shoulder their share of the load of teaching QL in their own context? Dedicated QL courses or integrated into existing geoscience courses?
* How can we continue to prepare students to meet the changing needs of the geoscience workforce?
* How can we use mathematics for inclusion and diversity rather than gatekeeping?