Quantitative Literacy (QL) and Numeracy: A Discipline-Based Education Research Perspective

Meghan Cook
University of South Florida, mlcook3@usf.edu

Victor J. Ricchezza
University of South Florida

Follow this and additional works at: https://scholarcommons.usf.edu/tlib_facpub

Part of the Library and Information Science Commons

Scholar Commons Citation
Cook, Meghan and Ricchezza, Victor J., "Quantitative Literacy (QL) and Numeracy: A Discipline-Based Education Research Perspective" (2018). Tampa Library Faculty and Staff Publications. 4.
https://scholarcommons.usf.edu/tlib_facpub/4

This Presentation is brought to you for free and open access by the Tampa Library at Scholar Commons. It has been accepted for inclusion in Tampa Library Faculty and Staff Publications by an authorized administrator of Scholar Commons. For more information, please contact scholarcommons@usf.edu.
Quantitative Literacy (QL) and Numeracy: A Discipline-Based Education Research Perspective from the Geosciences

Meghan L. Cook and Victor J. Ricchezza
University of South Florida
Madison’s *Everybody’s Orphan*

“Quantitative Literacy: Everybody’s Orphan” Bernard L. Madison, 2001, *Focus*

Context is key:

Math departments = no context,

discipline = nothing but context

This article provides an invitation for disciplines to take charge and raise the orphan.

Discipline-Based Education Research (DBER)

The big picture: Discipline-Based Education Research (DBER)

DBER is generally associated with STEM disciplines...

Discipline-Based Education Research (DBER):
“investigates learning and teaching in a discipline from a perspective that reflects the discipline’s priorities, worldview, knowledge, and practices” (DBER Report, 2012)

DBER is inherently interdisciplinary...Biology, geosciences, and astronomy education research are the most common disciplines. DBER is experts in a particular field figuring out what works best at instructing new experts in that same field. Those methods don’t necessarily work in other fields.

DBER and Geoscience Education Research (GER)


DBER - A Vehicle for QL Instruction

Geology includes quantitative practices (Manduca, et. al., 2008).

The lens of DBER/GER helps us find what works for geologists/geoscientists. We have the benefit of following 20 years of Len Vacher banging on that wall.

Perspectives - How We Got Here - Vic

BA - Geology - U. Florida 1999

Environmental Consulting to 2009

HS Science Teaching to 2014 (incl. Writing content for GA Virtual School)

Graduate School at USF with Len Vacher and Jeff Ryan:

How to put knowledge of geology together with love of educating

Discovery: DBER exists (GER), QL lacking in my prior education experience

MSc 2016, TA for Phy. Geology Lab (1yr), Comp. Geology (3.5 yrs)
Perspectives - How We Got Here - Meghan

2006 - BS in Geology

2009 - MS in Geology (TA’ed all along the way)

2009/2010 - 3-month volunteer at HVO

2010 - Took a break to work at local water management district

2011 - Began Ph.D. program in geology and independently began teaching at local state colleges/science heavy liberal arts college (always wanted to be a teacher)

Now - Ph.D. candidate and continue to teach at local state colleges
Perspectives - Current QL Instruction Thoughts

As HS science teacher, assigned students w/ lower math skill. I regret how little I fought to work it in anyway. QL is for everyone.

Teaching intro lab, >50% of students would skip a question requiring multiplication of two given values with a provided calculator.

Then I found Computational Geology... (see Vacher, 2000, 1998-2005; Fratesi and Vacher, 2005; McGee et. al., 2007; Vacher and Lardner, 2010, 2012; Lehto and Vacher, 2012; Vacher et. al., 2012; Ricchezza and Vacher, 2016, 2017a, 2017b, 2018; Connor and Vacher, 2016; Ricchezza, 2016)

Perspectives - Current QL Instruction Thoughts

Students take my courses for general ed req. = non-science majors who have avoided math up until this point.

Students cannot get past the idea of earth science/geology having math.

Students end up not even attempting activities involving math or QL, they accept taking a zero (even with one on one intervention).
In CG, students generally come in afraid of math but needing the credit and possibly aware they need the skills.

One key: acknowledging their fear without shame.

Geology has math in it.
Numeracy Breakdown

We did a quick analysis of the last three years of articles and notes from *Numeracy*. Based on our totally flawless and not-at-all-subjective categorizations:

Social Science/Humanities: 14
Mathematics/Statistics/Math Education: 14
Natural Science/Health Science: 9

How are other STEM-DBER folks (and for that matter, non-STEM) making QL adaptations?
So What, And Who Cares?

QL belongs in-context (thanks Bernie) and GER has quantitative context easily applicable for QL.

Non-geoscience DBER QL practices might apply to geosciences.

STEM (or non-STEM)-DBER-QL Alliance?

Publications in Numeracy trend towards subjects other than natural science and health.

The nature of DBER is that what works in the geosciences is domain-specific and may not work in other areas.

What works/worked for you?

Tell us a bit about what area you teach/research in, and how you’ve applied QL/DBER. Was it successful?

Vic Ricchezza
ricchezza@mail.usf.edu

Meghan Cook
mlcook3@usf.edu