

**AAC&U**  
**Conference on General Education and Assessment**  
**February 2005**  
**Panel Session on Quantitative Literacy:**  
**Everybody's Orphan, Everybody's Business**

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Issues/questions campuses thinking about quantitative literacy (QL) might want to consider.

1. Clarity about what QL means at your institution/to your faculty/for your students. Most likely it will include the following elements, among others, but it needs to be defined by the faculty of each campus so it can guide curricular design, teaching and classroom practices, and assessment.
  - using inductive and deductive reasoning
  - recognizing when approximation is more appropriate than a precise answer
  - distinguishing relevant from irrelevant information
  - recognizing and using mathematical modeling
  - trying different approaches and checking for errorsAnd doing all these things in context(s).
2. Levels of learning – what QL looks like at the novice, intermediate, and advanced levels; how it develops cumulatively over time.
3. The mechanism by which students should gain QL

Should learning mathematics and learning QL be treated separately or together? Clearly students need math concepts for QL. Beyond that, some people believe they should be separated although traditionally most people have thought of them as one and the same.

Alan Shoenfeld, UC Berkeley: thinks of mathematics and QL as overlapping. Given an appropriate pedagogical approach and classroom practices, one can learn QL as one learn mathematics.

However, this cannot happen if learning mathematics means simply producing proofs or working with “pre-cooked data.” Students need to confront ill-defined situations.

Larry Cuban: the quest for numeracy or QL is a plea for progressive pedagogy.

Since QL interacts with liberal learning, it is not simply the domain of a math course – or even of any single course. QL needs to be considered as part of general education – but also related to study in the disciplines. In fact AAC&U strongly advocates that all the important outcomes of college need to be the responsibility both of gen-ed and of the majors.

Developing a coherent approach to QL throughout a curriculum means looking beyond a single course, embedding QL in other fields, and teaching QL across the curriculum to build cumulative learning.

#### 4. Where should responsibility for QL reside?

In the math dept? If so, one needs to deal with issues of math in context, of pedagogy/classroom practices.

In the social sciences? Some people, typically not mathematicians, argue that QL is too important to be left to mathematicians whose training leans more toward the theoretical than the applied.

#### 5. Assessment

Arises directly from the specific outcomes desired:

- What should students know about QL and be able to do?
- How well are they learning it?
- How does the institution know?

Once the outcomes of QL are defined, a campus can design a program for finding out how well students are achieving these outcomes.

- Can they discern the quantitative issues of a problem of situation?
- Understand use of models and apply models to solve quantitative problems?
- Use data to make a forecast?

It is recommended that campuses think about creating an assessment plan that collects the data desired at the most relevant points of the curriculum – no more, no less – then uses that data for improvement.

Assessment would employ multiple methods (e.g., a combination of standardized and embedded; formative and summative; self, peer and teacher), all feeding into a cycle of revision and improvement.

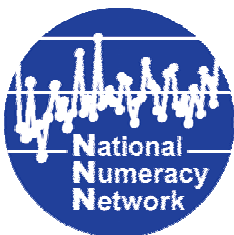
## Selected QL Resources

### National Organizations

Two nascent organizations are now providing opportunities for communication and professional exchanges among those working on Quantitative Literacy. The Special Interest Group (SIG) on Quantitative Literacy of the Mathematical Association of America (MAA) works primarily within the mathematical community. The National Numeracy Network seeks to build links across disciplines. Both organizations can be found on the Internet:

QL SIG: <http://pc75666.math.cwu.edu/~montgomery/sigmaaq/>

NNN: <http://www.math.dartmouth.edu/~nnn/>



First Annual Meeting of the National Numeracy Network  
June 18-19, 2005 Macalester College St. Paul, MN  
Program and registration information <http://www.math.dartmouth.edu/~nnn/>

### Publications and Reports

Available on MAA website: <http://www.maa.org/ql/index.html>

2004 *Achieving Quantitative Literacy: An Urgent Challenge for Higher Education.*

2003 *Quantitative Literacy: Why Numeracy Matters for Schools and Colleges.*

2001 *Mathematics and Democracy: The Case for Quantitative Literacy.* ([PDF format](#))

1997 *Why Numbers Count: Quantitative Literacy for Tomorrow's America.*

1994 *Quantitative Reasoning for College Graduates.* ([Report of an MAA Committee](#))

Available through the AAC&U website <http://www.aacu.org/peerreview/index.cfm>

2004 *Quantitative Literacy* Summer 2004 issue of Peer Review

## Workshops and Meetings

NECQL (Northeast Consortium for Quantitative Literacy) annual meeting April 23, Hamilton College, Clinton, NY. Contact Mary O'Neill [moneill@hamilton.edu](mailto:moneill@hamilton.edu)

PREP Workshop: Creating and Strengthening Interdisciplinary Programs in Quantitative Literacy. June 14-18, 2005 Macalester College St. Paul, MN

The goal of this workshop is for interdisciplinary campus teams to learn about many of the programs and assessment strategies that are now running, to gain familiarity with the tools, materials, and case studies that these programs have generated, and to have the opportunity to adapt and build upon these materials for use on their own campuses.

<http://www.maa.org/prep/2005/>

Annual Joint Meetings of the AMS and MAA January 2006, San Antonio contributed paper session on Quantitative Literacy <http://www.ams.org/amsmtg/national.html>

## Additional Websites

<http://www.StatLit.org>

<http://www.dartmouth.edu/~chance/>

<http://www.StatLit.org/QLit.htm>

<http://www.learner.org/exhibits/dailymath/>

<http://www.math.yorku.ca/SCS/Gallery/>

<http://www-personal.umich.edu/~mejn/election/>

Gallery of Data Visualization

this is the site with the map shown in the AAC&U presentation

## Selected Quantitative Literacy Programs in U. S. Colleges and Universities (*draft*)

(February, 2005)

**Alverno College** (Milwaukee, WI). A two-stage requirement: first, a course taught by mathematics instructors to develop mathematical skills and habits of thinking, then a discipline-based course where students interpret and evaluate discipline-specific quantitative information. *Contact:* Sue Mente <sue.mente@alverno.edu>.

**Augsburg College** (Minneapolis, MN). Two parallel programs. The older is a project supported by the Keck Foundation on *statistical* literacy. *Contact:* Milo Schield <milo@pro-nr.net>. URL: [www.statlit.org](http://www.statlit.org). The other is a new program focused on *mathematical* (or quantitative) literacy. *Contact:* Tracy Bibelnieks <bibelnie@augsb.org>.

**Bowdoin College** (Brunswick, ME). An established "Q-Skills" program assesses each first-year students' quantitative literacy; advises students regarding appropriate quantitative courses; and establishes study groups and provides individual tutoring in support of a new graduation requirement in quantitative reasoning. *Contact:* Linda Kirstein <lkirstei@bowdoin.edu>.

**Carleton College** (Northfield, MN). A new FIPSE-supported initiative intended to prepare students to evaluate and use quantitative evidence. Redesigned first-year courses will emphasize quantitative inquiry and reasoning; assessment will be through use of quantitative evidence in papers that students submit to meet an existing writing portfolio requirement. *Contact:* Neil Lutsky <nlutsky@carleton.edu>.

**Central Washington University** (Ellensburg, WA). A broad program designed to develop and assess students' capabilities in "analytical thought, symbolic reasoning, and quantitative analysis." *Contact:* Stuart Boersma <boersmas@cwu.edu>, Aaron Montgomery <montgoaa@cwu.edu>, or Linda Beath <beathl@cwu.edu>. URL: [www.cwu.edu/~avpugrad/assessment.html](http://www.cwu.edu/~avpugrad/assessment.html).

**Colby Sawyer College** (New London, NH). A first mathematics course is amplified by quantitative courses in the major and throughout the curriculum. *Contact:* Semra Kilic-Bahi <skilic-bahi@colby-sawyer.edu>.

**Dartmouth College** (Hanover, NH). Extensive online QL resources at the Center for Mathematics and Quantitative Education. *Contact:* Dorothy Wallace <dorothy.i.wallace@dartmouth.edu> or Kim Rheinlander <kim.rheinlander@dartmouth.edu>. URL: [math.dartmouth.edu/~mqed](http://math.dartmouth.edu/~mqed).

**DePauw University** (Greencastle, IN). An established "competence program" in quantitative reasoning is supported by a Q-Center for students and regular workshops for faculty who teach Q-courses. Assessed through surveys of faculty and students. *Contacts:* Mark Kannowski <kannowski@depauw.edu> or Rich Martoglio, <rmartoglio@depauw.edu>. URL: [www.depauw.edu/admin/arc/q\\_center/index.asp](http://www.depauw.edu/admin/arc/q_center/index.asp).

**Hollins University** (Roanoke, VA). Two quantitative reasoning requirements (q and Q) are required for graduation; an NSF grant supported development of Q courses across the curriculum. *Contact:* Caren Diefenderfer <cdiefenderfer@hollins.edu> or Phyllis Mellinger <pmellinger@hollins.edu>. URLs: [www1.hollins.edu/depts/q/index.html](http://www1.hollins.edu/depts/q/index.html) and [www1.hollins.edu/homepages/hammerpw/qrhomepage.htm](http://www1.hollins.edu/homepages/hammerpw/qrhomepage.htm).

**James Madison University** (Harrisonburg, VA). A systemic, institution-wide approach to quantitative literacy. *Contact:* David Brakke <brakke@jmu.edu>.

## QL Programs in Colleges & Universities (cont'd)

**Lawrence University** (Appleton, WI). Statistics across the curriculum as an approach to a competency requirement in quantitative analysis. *Contact:* Joy Jordan <joy.jordan@lawrence.edu>.

**Macalester College** (St. Paul, MN). Quantitative Methods for Public Policy. An interdisciplinary approach supported by a FIPSE grant involving courses in statistics, economics, political science, geography, and journalism that use quantitative methods to analyze the same policy issue. *Contact:* David Bressoud <bressoud@macalester.edu>. URL: [www.macalester.edu/qm4pp/](http://www.macalester.edu/qm4pp/).

**Trinity College** (Hartford, CT). Two levels of courses on quantitative literacy offered through the Math Center, as well as Center-sponsored quantitative enrichment throughout the curriculum, including the First Year Program, the Tutorial College, and courses in Human Rights, Political Science, History, Classics, Sociology and International Studies. *Contact:* Judy Moran <judith.moran@mail.cc.trincoll.edu>. URL: [www.trincoll.edu/depts/mcenter/](http://www.trincoll.edu/depts/mcenter/).

**University of Arkansas** (Fayetteville, AR). Quantitative literacy for journalists. *Contact:* Bernard Madison <bmadison@uark.edu>.

**University of Massachusetts** (Boston, MA). Building on a level I core competency in "understanding arguments," a level II quantitative reasoning competency requirement in the College of Public and Community Service is designed to help students "use quantitative skills to reason about various public and community issues." *Contact:* Maura Mast <mmast@math.umb.edu>, Marilyn Frankenstein <marilyn.frankenstein@umb.edu> URL: [www.cpcs.umb.edu/undergrad/curr\\_degree\\_req/core\\_highlights/qr\\_highlight.htm](http://www.cpcs.umb.edu/undergrad/curr_degree_req/core_highlights/qr_highlight.htm).

**University of Nevada** (Reno, NV). Brief modules on real QL issues (e.g., drug testing). *Contact:* Jerry Johnson <jerryj@unr.edu>. URL: [unr.edu/homepage/jerryj/NNN/QL.html](http://unr.edu/homepage/jerryj/NNN/QL.html).

**University System of Georgia** (Atlanta, GA). A Regents proposal, currently on hold, would require all college sophomores in Georgia to pass a quantitative skills test. *Contact:* Kathleen Burk <kathleen.burk@usg.edu>.

**Virginia Commonwealth University** (Richmond, VA). A general education requirement on "quantity and form" includes courses in mathematics, statistics, and critical thinking. *Contact:* Aimee Ellington <ajellington@vcu.edu>. URL: [www.has.vcu.edu/students/ug\\_edu/gen\\_edu/quantity\\_form.html](http://www.has.vcu.edu/students/ug_edu/gen_edu/quantity_form.html).

**The Washington Center** (Olympia, WA). Quantitative literacy across the curriculum. *Contact:* Emily Decker <deckere@evergreen.edu>, Gillies Malnarich <malnarig@evergreen.edu>. URL: [www.evergreen.edu/washcenter/nnnannouncement.htm](http://www.evergreen.edu/washcenter/nnnannouncement.htm).

**Washington State University** (Pullman, WA). Pilot program in quantitative literacy across the curriculum in four departments: mathematics, English, sociology, and mechanical engineering. *Contact:* Kimberly Vincent <vincent@math.wsu.edu>.

**Wellesley College** (Wellesley, MA). A two-tiered program in quantitative reasoning across the curriculum. *Contact:* Corrine Taylor <ctaylor1@wellesley.edu>. URL: <http://www.wellesley.edu/QR>.