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## Award Abstract #0717604

## Quantitative Inquiry, Reasoning, and Knowledge in Student Writing

NSF Org: [DUE](#)  
[Division of Undergraduate Education](#)

Initial Amendment Date: September 19, 2007

Latest Amendment Date: September 19, 2007

Award Number: 0717604

Award Instrument: Standard Grant

Program Manager: Myles G. Boylan  
DUE Division of Undergraduate Education  
EHR Directorate for Education & Human Resources

Start Date: September 15, 2007

Expires: August 31, 2010 (Estimated)

Awarded Amount to Date: \$499994

Investigator(s): Nathan Grawe ngrawe@carleton.edu(Principal Investigator)

Sponsor: Carleton College  
One North College Street  
Northfield, MN 55057 507/663-4000

NSF Program(s): CCLI-Phase 2 (Expansion),  
S-STEM: SCHLR SCI TECH ENG&MATH

Field Application(s): 0116000 Human Subjects

Program Reference Code(s): SMET,9178

Program Element Code(s): 7492,1536

### ABSTRACT

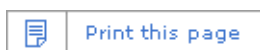
This project involves all undergraduate students and most of the faculty in the college. It is improving students' abilities to reason quantitatively and the faculty's knowledge of how to inculcate improved quantitative reasoning through improved instructional materials. This is providing students multiple opportunities to develop these skills in all academic departments. The primary method for doing this is through a deliberate modification and assessment of student writing portfolios that are being developed as part of the college's writing across the curriculum initiative. Analysis of student writing is being used as a basis for curriculum reform.

The vision of quantitative reasoning reflected in this project is compatible with the definition provided by the National Numeracy Network, which seeks to create "a society in which all citizens possess the power and habit of mind to search out quantitative information, critique it, reflect upon it, and apply it in their public, personal and professional lives." This Network "promotes education that integrates quantitative skills across all disciplines and at all levels." [July 19, 2007, <http://www.math.dartmouth.edu/~nnn/NNNVisionMission.html>]

Quantitative literacy is defined in the numerous contexts of its use. The emphasis is on developing a habit of mind that puts greater emphasis on quantitative communication. The multi-disciplinary character of quantitative reasoning places it outside traditional models of curricular reform, and presents challenges for traditional curricular reform and assessment strategies. Standardized tests are not well-suited to the assessment of quantitative reasoning due to the importance of developing this skill in the contexts of many disciplines. For this same reason, neither course grades nor test scores are reliable indicators of this skill. However, an earlier FIPSE grant has supported the Carleton College Quantitative Inquiry, Reasoning, and Knowledge (QuIRK) initiative, including the development of a novel model of assessment and curricular reform based on the evaluation of student writing. Building on this earlier work, this project is engaged in ongoing assessment results that are being used to guide curricular reform through faculty workshops and course and writing assignment revisions. These innovations in turn are being evaluated through further assessment of quantitative reasoning in student writing and shared through a program web site.

With advice from representatives from six other institutions and following the completion of feasibility studies at four partner colleges and universities, the Carleton approach is to be disseminated to four other colleges and universities - a 2-year college, a liberal arts college serving women, a Historically Black college, and a research university. Project materials are also being tagged for inclusion in the National STEM Digital Library.

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The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA  
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

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