LSA Quantitative Reasoning Assessment

1 Purpose of Study

According to the College of Literature, Science, and Arts (LSA) Bulletin, "The goal of the Quantitative Reasoning requirement is to ensure that every graduate of the College achieves a certain level of proficiency in using and analyzing quantitative information" (College of LSA, 2009). CRLT collaborated with LSA to evaluate its Quantitative Reasoning (QR) requirement in order to better understand its impact on student learning.

2 Assessment Design

- Students completed a survey (validated at the University of Wisconsin) at the end of the term that asked them to report:
  - gains they had made in 14 quantitative reasoning skills
  - the alignment of the course with LSA's goals for the QR requirement
  - an example of an application of their QR course and effective instructional methods
- Respondents were 1,419 first- and second-year students enrolled in one of 40 QR courses and a control group of 384 first- and second-year students who had not yet completed the QR requirement

"There was an emphasis on word problems that used real life examples for..using calculus. For instance, a couple of friends and I used optimization to find out the maximum number of rooms that could fit into a dorm if you needed to have both single and double dorm rooms."

-- Mathematics Student

3 Application and Instructional Methods

- Students were asked to describe a real-life example of how they left their QR course <u>better</u> able to use and analyze quantitative information.
  - Less than half of the respondents (42%) offered an example.
- Common themes of applications were:
  - students' development of evaluative skills (e.g., evaluation of ways that the media presents statistics)
  - applications to everyday problem-solving tasks
- When asked about **instructional activities that are helpful** to QR learning, only about a third (35%) of students selected "solving real-world problems."
  - This low proportion may help explain why the majority of students did not provide an example of the way in which they could apply their QR course concepts/skills.

4 Key Findings

- An overwhelming majority (76%) of students agreed or strongly agreed that their course fulfilled LSA's goals for the requirement.
- First-time QR takers agreed that they gained key quantitative reasoning skills in their Fall Term QR courses (M=3.52) (on a scale of 1-5, where 1=strongly disagree and 5=strongly agree).
  - Strongest gains were reported for "solve problems using arithmetic, algebra or statistics" (M=3.83) and "use quantitative information to solve problems" (M=3.79).
  - Weakest reported gains were "understand randomness, uncertainty and risk" (M=3.18) and "understand the difference between correlation and causation" (M=3.16).
- ***Enrollment in a QR course is the strongest predictor of students' reported quantitative reasoning gains, even when controlling for gender, race/ethnicity, class rank, and math proficiency.***

Prediction of Overal Mean QR Scores: Multipe Regression Analysis Results

	B	S.E. of B	Beta (Standardized B)	t-Statistic	Sig.
Enrolled in QR1?	**0.14**	0.050	0.076	2.82	**
Enrolled in QR/2?	**0.10**	0.049	0.055	2.06	*
Female Status?	**-0.06**	0.044	-0.039	-1.43	
Underrepresented Minority Status?	**0.11**	0.072	0.043	1.51	
Sophomore Status?	**0.13**	0.049	0.070	2.59	*
ACT Math Score	**-0.01**	0.006	-0.028	-0.96	
(Constant)	**3.50**	*0.178*		*19.63*	***

*p<0.05 ** p<0.01 *** p<0.001

Note: Students may fulfill the requirement by passing one course designated for QR credit (QR1) or two courses designed for half credit (QR/2). Because a wide margin (82%) of students fulfill the requirement through the former option, this evaluation focuses specifically on the impact of QR1 courses.

5 Implications for Teaching

- The QR requirement appears to achieve LSA's goals for student learning, and it should be maintained.
- Reported gains across departments offering QR courses are generally similar, indicating that the variety of courses fulfilling the QR requirement achieve relatively equivalent outcomes.
- Academic advisers should be aware that sophomores report greater learning gains from their QR courses compared to first-year students.
- More emphasis on teaching application and relevance in QR courses would likely heighten students' abilities to relate QR material to real world settings.

"I will now look at the way research is presented, not only in scientific research but also in popular news sources, differently. I also look at the way surveys/polls and other facts are presented with a more critical eye."

-- Communications Studies Student