

A BRIEF HISTORY OF QUANTITATIVE REASONING AT JOHNSON STATE COLLEGE

"Sproul, Glenn D @ JSC" <Glenn.Sproul@jsc.edu>

PART ONE: OUR CONTEXT

- **Early 1990's:** General Education Core Curriculum approved, incorporates existing two-course requirement in mathematics, along with two courses in writing, in the Fundamental Skills component.
- **2000** (or earlier?) the Vermont State Colleges Board of Trustees mandates the creation of "graduation standards" (aka "minimum expected competencies" in six areas, including Quantitative Reasoning (QR) at all five colleges in the system.
- **Summer of 2001:** representatives of the mathematics departments at the five colleges meet several times, led by the Academic Dean at Lyndon State College, to try to craft a uniform but flexible QR assessment rubric for the colleges.
- **Fall of 2001:** a draft of our working group's QR assessment rubric is disseminated throughout the system, and roundly criticized. (See e-mail exchange with M. Fishbein.)
- **Late 2001 to Spring 2005:** nothing happens. Faculty members generally antagonistic to Board mandate and passively resist administration efforts to implement new graduation standards.
- **Spring of 2005:** JSC receives 5-year Title III grant for curriculum reform and faculty development aimed at improving student retention. (The grant application highlights the intention of creating First Year Seminars and requiring each freshman to take an FYS.)

PART TWO: LAUNCHING A QR PROGRAM

- ***June of 2005:** two JSC faculty members attend PREP workshop on QR at Macalester College and get excited about starting a QR program at JSC. (* indicates supported by Title III funds.)
- **September of 2005:** QR Committee formed, “by invitation” to selected full-time faculty members from math, science, economics, behavioral science, music.
- ***January of 2006:** Caren Diefenderfer and Juergen Fleck (Hollins University) give presentation at JSC and meet with the QR Committee.
- ***June of 2006:** Corrine Taylor (Wellesley College) leads QR Committee members in four-day workshop on QR matters, including the design of QR Assessments.
- **September of 2006:** the QR Committee discusses the June workshop and preliminary ideas for developing a QR program at the Faculty Assembly.
- ***February of 2007:** Semra Kilic-Bahi and colleagues (Colby-Sawyer College) give presentation on Spreadsheets Across The Curriculum.
- **February of 2007:** the QR Committee presents its “Vision” of a QR program at JSC to the Faculty Assembly. The Vision provides for diagnostic QR assessment on entrance, an **Introduction to QR** course required for those doing poorly on the assessment, and at least two subsequent **Quantitatively Enriched (QE)** courses. A non-binding straw vote of the Assembly gives a clear mandate for the Committee to continue its work.

- **March of 2007:** the QR Committee presents its Vision Statement to a gathering of QR folks from all five VSC colleges, and receives general interest and support.
- **Fall of 2007:** the QR Committee clarifies its proposed criteria for QE courses.
- **February of 2008:** the QR Committee submits a formal proposal for “Stage One” of the QR Vision (entrance assessment and Intro to QR course) to the General Education Committee, which approves the proposal and forwards it to the Faculty Assembly.
- **March of 2008:** the Faculty Assembly gives unanimous approval to the “Stage One” proposal.
- **April of 2008:** a general invitation is extended to faculty to consult individually with QR Committee members about the possibilities for developing their courses into QE courses. Personal invitations are also extended to selected faculty members. The QR Committee develops a rough timetable for the development of QE courses.

May 1, 2008 update

APPROVING A COURSE FOR **QUANTITATIVELY ENRICHED** (QE) STATUS
4/23/08 update

This form should be completed and the indicated signatures obtained in order to have an existing course approved for QE status. The Quantitative Reasoning (QR) Committee, will review the course for QE status, and if it approves the course for QE status the request will be forwarded to the General Education (GE) Committee. Approval for QE status shall be limited to the sections of a particular course taught by the particular faculty member whose name appears below.

Faculty member's name _____
Course designator _____
Name of Course _____

_____ This course already has Curriculum Committee approval.

_____ The course has as a prerequisite prior passage of the Quantitative Reasoning (QR) Assessment or satisfactory completion of the Introduction to QR course.

_____ The course has as one its goals the development of the ability to apply Quantitative Reasoning skills thoughtfully and appropriately in context, and this goal is clearly stated in the course syllabus. Please attach a copy of the course syllabus.

Please explain:

- (1) how the course will include activities and assignments that distinguish the course from commonly taught comparable courses in regard to the use of Quantitative Reasoning;
- (2) how the course will include at least one major quantitatively based project, or several shorter quantitatively-based activities, or a persistent thread of development of Quantitative Reasoning skills throughout the course;
- (3) how the quantitatively-based activities and/or projects in the course are designed to promote the practice and application of key Quantitative Reasoning skills in the context of the course content, how they are designed to improve a student's ability to solve problems involving Quantitative Reasoning, and how opportunities are included for reflection, discussion and synthesis.

Signature of faculty member _____ Date _____

Approval by QR Committee _____ Date _____

Approval by GE Committee _____ Date _____

Academic Dean's Approval _____ Date _____

Requirements for QE status

The criteria for a course to be designated as Quantitatively Enriched (QE) are listed below. On the reverse side of this sheet is a list of basic Quantitative Reasoning (QR) skills developed by the QR Committee.

- (a) A QE course would have as a prerequisite prior passage of the Quantitative Reasoning Assessment or satisfactory completion of the Introduction to Quantitative Reasoning course.
- (b) A QE course would have as one of its goals the development of the ability to apply QR skills thoughtfully and appropriately in context, and this goal should be clearly stated in the syllabus.
- (c) A QE course would include activities and assignments that distinguish the course from commonly taught comparable courses in regard to the use of Quantitative Reasoning.
- (d) Mathematics courses which are used to meet the mathematics requirement under the GECC would not be designated as QE courses, but other GECC courses might count as QE courses.
- (e) A QE course would include at least one major quantitatively based project, or several shorter quantitatively based activities, or a persistent thread of development of QR throughout the course.
- (f) The quantitatively based activities or projects would promote the practice and application of key Quantitative Reasoning skills in the context of the course content. They should lead to an improvement in a student's ability to solve problems involving Quantitative Reasoning, and should include opportunities for reflection, discussion and synthesis.

The following list may serve as an aid to faculty members in the design of appropriate activities and projects for QE courses.

This is a list of basic desirable Quantitative Reasoning (QR) skills the QR Committee has developed. It is **not** a required checklist to certify that a course merits QE status, but provides information about the kinds of skills to expect of students who enroll in QE courses. Students who meet the common prerequisite for QE courses should already possess most of these skills. There is not a particular minimum number of skills in this list that need to be used in a QE course, but the list is intended to suggest the kind and level of quantitative skills which would be appropriate to include and reinforce in a QE course. Note: throughout the list, “appropriately” means *in context*.

- Be able to do simple arithmetic, managing negative numbers and order of operations appropriately.
- Understand and use fractions, decimals, ratios and percents appropriately.
- Manage unit conversions.
- Use simple equations accurately.
- Use proportions appropriately.
- Read graphs and tables and interpret them appropriately.
- Construct graphs from given data.
- Understand basic information about angles, similar triangles and right triangles.
- Use the Pythagorean Theorem in a right triangle.
- Understand and be able to recognize the difference between linear growth and exponential growth.
- Understand the use of scientific notation and exponents.
- Use the equation of a line appropriately.
- Be able to use common measures of length, area, volume, weight and density appropriately.
- Be familiar with the metric system of weights and measures.
- Understand the effects of scale changes on area and volume.
- Be familiar with the mean, median and mode of a set of data.
- Be able to calculate a weighted average.
- Be able to recognize a bell-shaped or “normal” distribution.
- Have an intuitive understanding of standard deviation as a measure of data dispersion.

SUGGESTED TIMELINE FOR DEVELOPING QE COURSES

G.S., 4/23/08

By September, 2008: have identified approximately 10 courses and faculty members for the first round of QE course development, and have mentoring relationships established between these faculty members and members of the QR Committee.

During the Fall of 2008: support the people developing QE courses with opportunities to get together to share ideas. Seek one or more guest speakers/consultants who are incorporating QR activities in courses in the Arts, Humanities, and Social Sciences. Work with the Registrar to ensure that the QE label can be attached to courses soon, hopefully for Spring 2009 course offerings, both in the course schedule and on the student's transcript.

By December, 2008: have the first round of QE courses approved by the QR Committee and the General Education Committee.

During the Spring of 2009: continue to support the people developing QE courses with opportunities to get together to share ideas. Consider other ways to enrich the process: guest speakers, workshops, etc.

By May, 2009: have 15 to 20 QE courses approved for the following academic year.

During the Fall of 2009: continue to support the people developing QE courses with opportunities to get together to share ideas. Continue to consider other ways to enrich the process: guest speakers, workshops, etc.

By December, 2009: have at least two dozen QE courses approved. Prepare to bring a proposal to implement Stage Two of the QR Vision to the General Education Committee and the Faculty Assembly early in 2010.