Goals for Level 1 QR-Connected Curricula

- ❑ Following is a listing of the kinds of QR learning that the QR Team hopes can happen in Level 1 QR-Connected Instructional Activities.
- ❑ We do not expect that every instructional activity will include all of these possible learning experiences. But, we feel that every faculty could include some of them, with *at most* a few brief meetings or phone conversations with QR faculty. Also, we intend these learning experiences to involve very little, if any, 'extra' class time.
- ❑ The focus is on being alert to opportunities to change the culture around QR:
    - ◆ to name the quantitative reasoning you already have in your curricula so that students realize they are already using QR
    - ◆ to motivate students to feel they can and want to include quantitative reasoning in their studying about public and community service issues
    - ◆ to help students develop self-assessment and study skills that will further their QR knowledge
- ❑ We feel that preparing students for QR throughout the curriculum at Level 1, will have a significant impact on their success throughout the curriculum.

Goals for Level 1 QR-Intensive Curricula

- ❑ Following is a listing of the kinds of QR learning that the QR Team hopes can happen in Level 1 QR-Intensive Instructional Activities. The main difference from the QR-Connected is that the QR-Intensive instructional activities, which currently involve the Understanding Argument classes, will include regular opportunities for realizing these goals. In other words, most of the arguments in the class will have some numerical evidence supporting their conclusions, whereas a QR-Connected Media Literacy class might have an occasional chart or other kind of numerical description.
- ❑ The focus in the QR-Intensive, as well as the QR-Connected is on being alert to opportunities to change the culture around QR:
    - ✳ We feel that preparing to name the quantitative reasoning in your curricula so that students realize they are already using QR
    - ✳ to motivate students to feel they can and want to include quantitative reasoning in their studying about public and community service issues
    - ✳ to help students develop self-assessment and study skills that will further their QR knowledge
- ❑ An additional focus in the QR-Intensive (which may happen a bit in the QR-Connected) is the previewing of QR. For example, a particular argument may call for rewriting fractions as percents in order to make comparisons necessary to understand the reasoning. In Level 1 QR Understanding Arguments, the rules for rewriting would be briefly reviewed and practiced. In QR Level 2, those rules would be encountered in a more linear development of the underlying math skills, and explained more deeply, connected to other understandings of the structure of the number system.
- ❑ Another additional focus in the QR-Intensive (which may happen a bit in the QR-Connected) is the analyzing of QR learning difficulties. In QR Level 2 these difficulties would be central to the lesson (if shared by many students) or central to an individual office meeting; in Level 1 QR Understanding Arguments, these difficulties would more likely be referred to a math tutor or a QR faculty.
- ❑ These contrasts between QR Level 1 and QR level 2 are *not* meant to *prohibit* other faculty from tackling these difficulties! 'Outsiders' to QR teaching may indeed find more effective solutions to students' learning difficulties. These contrasts are only stated in order to *not* discourage other faculty from participating in Level 1 QR Understanding Arguments. A faculty person does not have to be able to teach QR Level 2 in order to do a fine job in Level 1 QR Understanding Arguments.
- ❑ We feel that preparing students for QR throughout the curriculum at Level 1 will have a significant impact on their success throughout the curriculum.

Motivating QR

♦ **Challenging emotional blocks**—convincing students that they *can* learn QR (understanding personal and institutional factors that may have been internalized, and have convinced students that they can not do math, and have led to developing unproductive strategies such as being too embarrassed to ask questions, and not respecting one's own work enough to check if answers make sense); understanding the politics of knowledge and how power relations are psychologically internalized—"…the intellectual activity of those without power is always labeled non-intellectual" [Freire and Macedo])

♦ **Challenging intellectual blocks**—convincing students that there are important public and community service reasons *why* the numbers count (e.g., numerical data can cut through the lies that so many take as common sense knowledge about the way our society is structured; numerical data can obscure the realities of people's lives)

Developing QR Study Skills

♦ **Dispelling misconceptions about learning and doing math**—there are often many correct methods to solve QR problems; in real real-life QR problems there may be many correct answers; deep learning involves learning from mistakes; deep learning involves tolerating ambiguity

♦ **Teaching what studying means**—reviewing, re-writing, self-reflection, self-assessment, deepening layers of questions, tolerating ambiguity, tolerating the initial confusion from learning in an integrated, in-depth way, time, motivation (*The Importance of the Act of Studying*, Paulo Friere)

Previewing QR in Non-Linear Threads

♦ Provide opportunities to practice figuring out what the numbers mean, *and do not mean*—using a variety of different types of tables and graphs; a variety of ways of expressing the data (i.e., fractions, percents); and, a variety of ways of summarizing the data (i.e., averages, various groupings such as quintiles)

♦ Help students understand that they do understand something about the numbers

♦ Help students sharpen questions that focus on what they do not understand about the numbers

Analyzing QR Learning Difficulties

♦ Analyze what QR knowledge you need to understand each QR-connected item in your curriculum, including what basic calculations you could perform to better understand the data

♦ Research with the students how to get answers when you cannot answer their QR questions

♦ Refer students who need to spend more time on basic QR math skills and concepts to the CPCS tutoring program