# Quantitative Reasoning Assessment – Executive Summary
## Fall 2014 – Spring 2015

**Overview**
The assessment team assessed student progress towards the Quantitative Reasoning competency area during the 2014-2015 academic year.  The assessment team collected quantitative and qualitative data on student learning in the initial round of data collection. The assessment team analyzed the results of the initial data collection and then conducted Faculty Focus Groups in Spring 2016 to gather additional insights and feedback from faculty. This report summarizes the results of the quantitative data on student achievement and the qualitative data generated during the Faculty Focus Groups.

Fall 2014 – Spring 2015
232 students participated in QR Assessment during Fall 2014 - 2015
6 different course subjects (ECN 101, ECN 102, MAT 137, MAT 167, PHY 121, PSY 201)
8 participating faculty members
Spring 2016
10 faculty participated in 5 Focus Groups

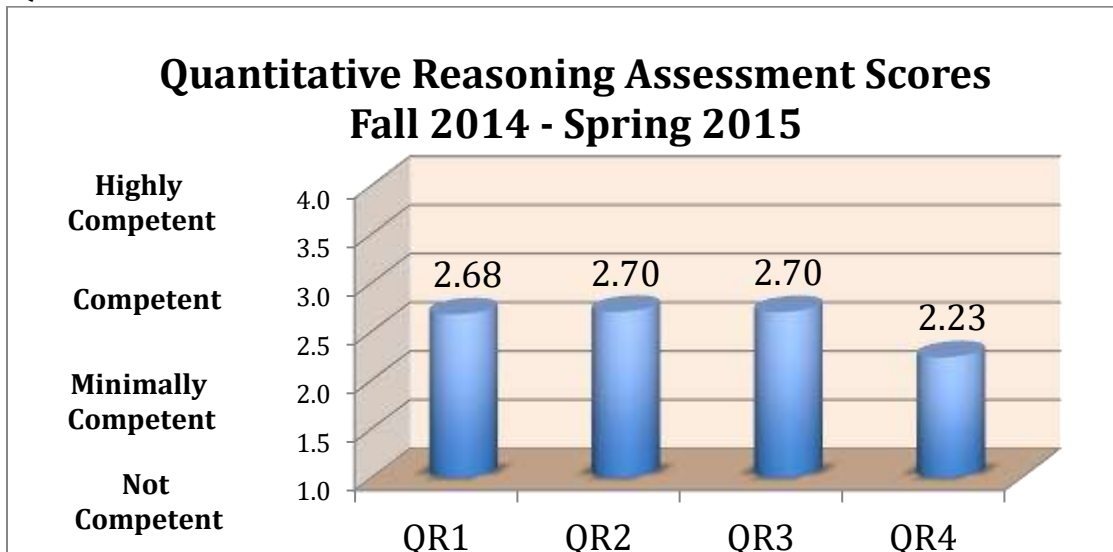**Quantitative Reasoning Competency**
**QR1** - Represent mathematical and quantitative information symbolically, graphically, numerically and verbally.
**QR2** - Apply quantitative methods to investigate routine and novel problems.  This includes calculations/procedure, mathematical and/or statistical modeling, prediction and evaluation.
**QR3** - Interpret mathematical and quantitative information and draw logical inferences from representations such as formulas, equations, graphs, tables and schematics.
**QR4** - Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.

**Quantitative Results**



Quantitative Reasoning Assessment Scores Fall 2014 - Spring 2015

| Competency Level | QR1 | QR2 | QR3 | QR4 |
|---|---|---|---|---|
| Score | 2.68 | 2.70 | 2.70 | 2.23 |

Scale: Highly Competent (4.0), Competent (3.0), Minimally Competent (2.0), Not Competent (1.0)

## Summary of Qualitative Results

Faculty identified numerous areas of concern that hinder students' ability to demonstrate quantitative reasoning. These areas of concern were:

- Students difficulty with Critical Thinking and Abstract Thinking
- Students lack of confidence, and corresponding anxiety surrounding math assignments
- Students lack of Academic Foundations in Mathematics and English

Faculty also identified numerous solutions to better support student learning, such as:

- Incorporating more Real-world Problems into the curriculum
- Effective Utilization of Technology

## Highlights

### Critical & Abstract Thinking

Faculty proposed improving students' critical thinking and abstract thinking in mathematics by reducing the number of learning outcomes listed in math courses. Faculty also suggested providing more open-ended questions for students to explore solutions and more real-world problems where students can relate the math problems to real life situations.

**7 out of 10** faculty expressed an interest in participating in a future workshop on Critical Thinking in Mathematics. **9 out of 10** faculty expressed an interest in participating in a future workshop on Abstract Thinking within Mathematics.

### Real-World Problems

**7 out of 10** faculty stated incorporating real-world problems into their courses is an effective strategy for teaching quantitative reasoning skills. **9 out of 10** faculty state if the College were to develop a repository of real-world problems that can be used in your courses, they would use it. **9 out of 10** faculty said they would be willing to share their problem sets in this repository. **8 out of 10** faculty expressed an interest in participating in a future workshop on this topic.

### Faculty Concerns

Below are the top 4 faculty concerns related to student performance that were identified by faculty. Following each concern are strategies faculty identified to overcome them.

**Concern #1.  Poor Attendance**

- Increase outreach to students having difficulty or missing class and use Care reports
- Offer hybrid sections for students who might not finish semester
- Permit students to attend or sit-in other sections that fit their schedule
- Allow students to attend class from home with technology, including Blackboard

**Concern #2. Students Do Not Prepare for Class**

- Ask questions at beginning of class to incentivize students to come to class prepared
- Have students come to class with two questions to ask the instructor
- Include variety of activities in class, bonus points for excellent attendance

**Concern #3. Difficulty with Critical Thinking**

*(strategies summarized above)*

**Concern #4. Inability to apply prior learning from previous semesters**

- Ensure students take courses in sequence and avoid big gaps between courses
- Identify and prevent against grade inflation

## Personal Attributes

**8 out of 10** faculty referenced students' lack of confidence and/or math anxiety as a serious impediment to their success in their course. Participating faculty identified numerous techniques they use to help students overcome their lack of confidence or anxiety:

- Incorporating growth mindset topics that address the brain, learning, math anxiety, confidence into QR courses
- Addressing and confronting math anxiety early in the semester
- Discussing and reflecting upon the sizeable progression of skills gained over a semester through knowledge checks and retesting early concepts
- Practicing in small groups with one strong student in each group
- Providing students' incentives to go to the ASC for tutoring
- Providing collaborative learning that provides incentive if all students learn a concept, so students are encouraged to help each other

## Use of Technology

Participating faculty identified numerous benefits with online learning tools and technology aids in teaching mathematics. Faculty expressed that more resources and options for students are better and expressed support for more Open Education Resources (OER). The most popular tools identified from Focus Group participants were:

- Graphing Calculator
- Khan Academy
- MyMathLab

Participating faculty identified best practices and techniques for using myMathLab, that include:

- Discussing with students myMathLab capabilities how we use them
- Making sure students are shown the learning aids
- Removing content that is inappropriate
- Providing faculty development on how to effectively use myMathLab