GE SLO 2 – Quantitative Reasoning: SUMMARY AND REPORT

NARRATIVE

On May 5th, 2016, an inter-disciplinary group of six faculty convened to discuss GE-SLO 2 (quantitative reasoning). All but one member of the group was, in the Spring 2016 semester, either teaching or providing a service, at least one of whose SLOs supports the GE-SLO for quantitative reasoning.

The group included representation from:

- Instructional disciplines: Math, Economics, Oceanography, Nursing, Music
- Academic services: the Learning Center
- Students (two SI tutors, and some student guests)

WORKSHOP DISCUSSION

Although the discussion was pretty free-flowing, we did cover the three main points of the agenda.

1. What *is* quantitative reasoning?
2. What skills/abilities do we want our students to take with them?

(Both points turned into the same question.)

We considered some definitions of "quantitative reasoning" as a general education outcome, as it relates to our disciplines. Quantitative reasoning involves:

- quantitative *literacy* – a knowledge of, and ability to apply, basic mathematical concepts (e.g., rate v. duration, etc.) to solve problems or understand situations;
- The ability to understand and use statistical models to make predictions;
- The ability to take a statement with a quantitative component and extrapolate usable knowledge;
- The ability to resist the rhetorical power of numbers, and to think critically about statements with quantitative component (e.g., recognizing the prosecutor's fallacy).

We also discussed what this might look like: how we would like students to be able to push the boundaries, to apply what they've learned in different ways, rather than always in the context of a single discipline or particular graded assignment.

3. Can we define a common, interdisciplinary "GE" assessment?

Here, we discussed some of the main challenges not only to assessing student learning, but to student learning itself:

- Students often haven't retained basic scientific concepts from previous math/science courses, so there's a lot of review. As noted above, though, doing too much makes for a shallow facsimile of learning. Is this a problem of curriculum design?

- GE SLO assessment will most likely end up as yet another exercise in compliance that does nothing for students. In a lot of departments, we need to change the culture. We debated how best to do this. On the one hand, there's no point spending time thinking about meaningful assessment, or about how to improve student learning, if people just keep doing the same old things in their classrooms. On the other hand, perhaps the only way to start changing the culture is to start doing meaningful activities – to throw the party, so to speak, and then there is something for people to join in if they are so inclined.

- The biggest challenge is getting students to knit their various bits of learning together, to apply it in new ways and in uncharted territories. Grading your own students necessarily means that each course feels self-sufficient, and the learning takes place in a social context where the first requirement is to please the instructor – how to get past this, so students really leave with something?

We discussed some of the shortcomings of the SLO process so far:

- The SLO "assessment" routines so far have not been very helpful in promoting student learning. For one thing, there's been so little clarity about how and why to do even course-level assessments (for instance, are we only supposed to grade students who get C or better – and doesn't that miss out the most important population?). For another, it hasn't changed the culture in many departments; it just represents another box to tick off. How useful will assessment be if it doesn't change the culture? Student guest participants underscored this, with one arguing that the most important factor in their own development was the presence of an instructor who was concerned with their growth. (Note: This is something that the CAC and the ASGC is dealing with at the moment, so problems of ambiguous policy and procedures should be resolved soon.)

- The focus on alignment (assessing course outcomes aligned with quantitative reasoning, for instance) is confining. We should encourage participation in GE assessment from all kinds of disciplines – English, for instance, has no outcomes aligned with "Quantitative Reasoning," but why not participate? English teachers do ask students to interpret graphs and challenge statistical interpretations. And music involves developing sensitivity to, and awareness of, mathematical patterns.

- Using grades on course assignments for GE assessment is unsatisfactory. One of the big problems is that students generally forget what they learn in one course as they move on, because they've learned too much too quickly. An out-of-course assessment could ask students to push the boundaries – to apply what they know in different ways, in an interdisciplinary

setting. One student participant pointed out that it would be unfair to grade students on some skill or ability that went beyond the scope of the course.

3. Defining a common, interdisciplinary "GE" assessment?

One of the goals going in was to see if we could, or should, create a common assessment or a common rubric to look at student work, to get a perspective on *real* student learning in quantitative reasoning – the kind of learning that doesn't evaporate when one leaves the classroom (as one student participant pointed out, when you really learn something, you don't forget it).

What should we look for? Some thoughts:

- BASIC SKILLS & KNOWLEDGE. Transfer institutions sometimes complain that students arrive without all the skills & knowledge they need for scientific majors. Should we take the "entry" requirements as our exit point? (It's been proposed in some disciplines.) But this raises curricular problems – it means covering too many things in a shallow way, and students can't retain them – it's better to cover a few things, clearly and in depth, and make sure that students have really grown and learned.

- ABILITY TO USE KNOWLEDGE. How do students use the skills they've learned? An interdisciplinary group could ask students to do something that required an out-of-the-box application of what they'd learned – pulling together elements of critical analysis from different courses to grapple with a statement, argument or topic with a quantitative component.

How should we conduct such assessments? Some thoughts:

- RUBRICS. We discussed rubrics at some length – the AACU offers a template defining quantitative reasoning, and giving a detailed rubric for measuring it. But is this part of the problem? It's so specific that it fosters the kind of check-the-box assessment that isn't helpful. Many participants had had success getting students to collaborate on developing a rubric.

- SELF-ASSESSMENT / REFLECTION: Other participants had used reflection papers, asking students to self-assess (in prose rather than a survey). One student participant argued for a simple self-assessment: What have you learned? How have you grown?

- INTERDISCIPLINARY SESSIONS. One idea seemed to emerge: that we could get selected students (whole sections? a targeted group?) to participate in some interdisciplinary activity, observed and compered by a panel of participating instructors. Example: Students could discuss a particular topic (e.g., climate change, immigration reform) the arguments of which rely, in part, on quantitative reasoning. Or they could be asked a slightly left-field question (of the kind used often in interviews) to see how they would apply what they'd learned to handle it.

4. Next steps

We agreed that we could not create a common assessment activity to apply *this* semester – we're too late in the term. But going forward, it would be interesting and useful to plan an interdisciplinary activity that could bring students and professors together from different disciplines – a discussion forum maybe? – to see how students apply their quantitative knowledge in a wider way. (CSM will be devoting more flex days to this kind of project.)