2019 Summer Assessment Institute: Quantitative Literacy

Overview

A faculty institute occurred in July 2019 to assess LCC's progress with student learning outcomes in the area of Quantitative Literacy. The institute consisted of ten faculty participants and a faculty coordinator. Following an open-call for applications, participants were selected by the Vice President of Instruction. Participants included **Sue Bennett, Merry Bond, J Haynes-Hughes, Klint Hull, Allison McCrady, Holly McShane, Connie Ramos, Anita Quirk, David Rosi and Chris Tower**. **Brad Benjamin** served as faculty coordinator.

Faculty contributed over 450 artifacts during the 2018-19 academic year from a variety of disciplines. Of the artifacts submitted, 121 randomly selected artifacts were evaluated using the Quantitative Literacy VALUE rubric developed by the American Association of Colleges and Universities (AAC&U). A minimum of two readers evaluated each artifact.

Results

Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

Outcome	Average
A) Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)	3.2
B) Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)	3.3
C) Calculation	3.6
D) Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis	2.7
E) Ability to make and evaluate important assumptions in estimation, modeling, and data analysis	2.5
F) Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)	3.0
Overall	3.1

Notes: scores converted from a four to a five-point scale, in order to correspond with other LCC rubrics. When raters determined artifacts to be non-assessable, no score was recorded.

Inter-Rater Reliability

Inter-rater reliability was addressed in multiple ways. First, the institute began with an intensive norming (calibration) session during which faculty read and discussed artifacts to ensure that the rubric was being interpreted similarly by all participants. Next, score sheets were evaluated as they were completed in order to ensure that scores did not deviate by more than a point (for example, a 3 and a 4 would be considered an acceptable deviation). If scores deviated by more than a point (for example, a 2 and a 4) a third read was required. Scores were also monitored throughout to ensure that specific individuals were not consistently scoring differently. Institute facilitators ensure that groups with patterns of deviation discuss their findings in small groups to improve calibration.

Outcome	Number of Completed Evaluations	Required Third Reads due to Scoring Deviation of more than one point
A) Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)	94	14 (15%)
B) Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)	112	4 (4%)
C) Calculation	104	7 (7%)
D) Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis	103	9 (9%)
E) Ability to make and evaluate important assumptions in estimation, modeling, and data analysis	75	28 (37%)
F) Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized)	102	16 (16%)
Overall	121	78 (65%)

Observations

- There was considerable difference of opinion over whether or not particular artifacts were, in fact, assessable. The inter-rate reliability statistics don't necessarily represent the lack of consensus on that point, since raters who determine an artifact is non-assessable don't record a score.
- It is clear that we don't do enough across the curriculum on how to understand graphical information, or how to understand the assumptions that go into getting data (or we didn't get the artifacts to demonstrate it).

- These outcomes are difficult to assess when we can't see what students are doing (when we just see the final product). Our assignments need to draw that out. Reflection paper requirements and specific prompts (e.g., how did you determine that your answer was valid?) are examples of how to do this.
- It was noted that the AAC&U rubric is more asset than deficit-oriented, compared to the LCC rubrics (which include more negative language).
- Even when the assignment called for it, in most cases we didn't see much analysis. For example, the "Chemistry in the News" assignment was beautifully designed for this set of outcomes, but students didn't do what they were supposed to.

Recommendations

- Stick with AAC&U rubric using the title "Quantitative Literacy."
    - Eliminate subtitles (Interpretation, etc.)
    - Eliminate words on numerical scale (capstone, etc.).
    - Customize to 5-point scale.
    - Adjust language and levels.
    - Include category that is more in line with the "1" on other LCC rubrics.
    - Pay particular attention to levels within Communication, which seem to be off.
    - Complete draft by end of fall quarter if possible.
    - Klint, Sue, David, Brad and Allison volunteered to work on customized rubric.
    - Consider whether calculation should be included on the rubric, or is more accurately captured by subject-matter-experts in their own disciplines (in theory, this should be captured via the Curriculum & Program Review documentation).
- Develop a better mechanism to capture which outcomes the artifacts are intended to represent, as determined by the faculty member submitting the artifact.
- Consider using more specific "high score" and "low score" artifact examples during norming.
- Re-incorporate Global Skills into winter and spring assessment days.
- Include definitions of the relevant Global Skills in emails soliciting artifacts.
- Identify ways to increase the quantitative literacy among faculty and staff (through professional development activities) before we assess this set of outcomes again.
- Consider making certain types of artifacts, such as spreadsheets, available digitally at future institutes to view formulas, etc.

In-service Activity

- Following a short report-out on Quantitative Literacy, the focus will shift to Interpersonal Relations. Institute participants will help lead the workshop.
    - Introduce the topic (Interpersonal Relations – go over rubric).
    - This is what helps us with the assessment process.
    - What classes should support this set of outcomes?
    - How do students demonstrate this set of skills?
    - Following a few examples from institute participants, break into small groups.
    - Have small groups brainstorm ways to get students to engage in, demonstrate and document these skills.
    - Have a "report out" at the end and capture ideas in a document to share with all faculty (full- and part-time).

- Consider ways to digitally capture people interacting (for example, have students record their group work via cell phone and submit to instructor—ideally as part of the assignment since students don't do optional).
- Work on identifying specific assignments within departments or disciplines that apply to Interpersonal Relations.
- Meet on Friday, September 13 to plan the workshop (invite all institute participants).
- Possibly create a Canvas shell containing information about how to capture examples of students demonstrating these skills, such as through digital recordings.