The VALUE rubrics emerge from a process that examined many campus rubrics for each outcome and from the knowledge of faculty experts. They articulate fundamental criteria for each outcome demonstrated at progressively more sophisticated levels. The rubrics are intended primarily for institutional level use in evaluating and discussing student learning. The core expectations articulated in the VALUE rubrics can be translated into the language of individual campuses, disciplines or even courses. At the same time, the VALUE rubrics position learning at all undergraduate levels within a basic framework that is shared nationally.

# Definition

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).

# Quantitative Literacy Across the Disciplines

Current trends in general education reform demonstrate that faculty are recognizing the steadily growing importance of Quantitative Literacy (QL) in an increasingly quantitative and data-dense world. The AAC&U’s recent survey showed that concerns about QL skills are shared by employers, who recognize that many of today’s students will need a wide range of high level quantitative skills to complete their work responsibilities. And virtually all of today’s students, regardless of career choice, will need basic QL skills like the ability to draw information from charts, graphs, and geometric figures, and the ability to accurately complete straightforward estimations and calculations.

And yet preliminary efforts to find student work products which demonstrate QL skills proved a challenge. It’s possible to find pages of mathematical problems, but what those problem sets don’t tell us is whether the student was able to think about and understand the meaning of her work. It’s possible to find research papers that include quantitative information, but those papers often don’t provide evidence that allows the reader to see how much of the thinking was done by the original source (often carefully cited in the paper) and how much was done by the student himself – or whether conclusions drawn from analysis of the source material are even accurate.

Given widespread agreement about the importance of QL, it becomes incumbent on faculty to develop new kinds of assignments which give students substantive, contextualized experience in using such skills as analyzing quantitative information, representing quantitative information in appropriate forms, completing calculations to answer meaningful questions, making judgments based on quantitative data, and communicating the results of that work for various purposes and audiences. As students gain experience with those skills, faculty should develop assignments that require students to create work products which reveal their thought processes and demonstrate the range of their QL skills.

In this packet, we provide for faculty a definition for QL, examples of assignments from various disciplines which allow students to demonstrate their QL skills, and a rubric describing four levels of QL achievement which might be observed in work products within a student portfolio. Members of AAC&U’s rubric development team for QL hope that these materials will aid in the assessment of QL – but, equally important, we hope that they will help institutions and individuals in the effort to more thoroughly embed QL across the curriculum of colleges and universities.

# Framing Language for the VALUE Quantitative Literacy Rubric

This rubric has been designed for the evaluation of work that addresses quantitative literacy (QL) in a substantive way. QL is not just computation, not just the citing of someone else’s data. QL is a habit of mind, a way of thinking about the world that relies on data and on the mathematical analysis of data to make connections and draw conclusions. Teaching QL requires us to design assignments that address authentic, data-based problems. Such assignments may call for the traditional written paper, but we can imagine other alternatives: a video of a powerpoint presentation, perhaps, or a well designed series of web pages. In any case, a successful demonstration of QL will place the mathematical work in the context of a full and robust discussion of the underlying issues addressed by the assignment.

Evaluators are encouraged to assign a zero to any performance that doesn’t meet level one performance.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **4** | **3** | **2** | **1** |
| **Interpretation**  *Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).* | Provides sophisticated explanations of information presented in mathematical forms. | Provides accurate explanations of information presented in mathematical forms. | Provides somewhat accurate explanations of information presented in mathematical forms, but makes minor errors. | Attempts to explain information presented in mathematical forms, but makes major errors. |
| **Representation**  *Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words).* | Skillfully converts relevant information into mathematical forms, appropriate for the task at hand. | Competently converts relevant information into mathematical forms, usually appropriate for the task at hand. | Developing the ability to convert relevant information into mathematical forms, as appropriate. | Displays difficulty in converting relevant information into appropriate mathematical forms. |
| **Calculation** | Attempts and successfully completes all appropriate calculations for the task at hand. | Successfully completes appropriate calculations attempted. | Appropriate calculations for the task at hand are not attempted or are not completed uniformly and successfully. | Appropriate calculations for the task at hand are unsuccessful and/or not attempted. |
| **Application / Analysis** *Ability to make judgments and draw appropriate conclusions based on the*  *quantitative analysis of data, while recognizing*  *the limits of this analysis* | Engages in a process that uses the quantitative analysis of data as the basis for **sophisticated judgments**, drawing **insightful conclusions** from this work. | Engages in a process that uses the quantitative analysis of data as the basis for **competent judgments**, drawing **reasonable conclusions** from this work. | Developing the ability to engage in a process that uses the quantitative analysis of data as the basis for **judgments**, drawing **plausible conclusions** from this work. | Attempts to engage in a process that uses the quantitative analysis of data as the basis for **judgments**, attempting to draw **conclusions** from this work. |
| **Assumptions**  *Ability to make and evaluate important assumptions in estimation, modeling, and data analysis* | Explicitly describes assumptions, and provides compelling rationale for why each assumption is appropriate. Shows awareness that confidence in final conclusions is limited by the accuracy of the assumptions. | Explicitly describes assumptions, and provides compelling rationale for why each assumption is appropriate. | Explicitly describes assumptions. | Attempts to describe assumptions. |
| **Communication**  *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)* | Use of quantitative information markedly enhances the argument or purpose of the work. | Use of quantitative information enhances the argument or purpose of the work. | Use of quantitative information supports the argument or purpose of the work. | Use of quantitative information weakly supports the argument or purpose of the work. |

Created by a team of faculty from higher education institutions across the United States.