

Virginia State University General Education QUANTITATIVE LITERACY VALUE RUBRIC

For more information, please contact value@aacu.org

The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 16 of the VALUE rubrics can and should be translated into the language of individual campuses, disciplines, and even courses. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such that evidence of learning can be shared nationally through a common dialog and understanding of student success.

Definition

Quantitative Reasoning is the ability to manipulate, analyze, and/or evaluate numbers and numerical data and use results to support conclusions. It may involve calculation and/or analysis and interpretation of quantitative information derived from existing databases or systematic observations.

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. 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. Virtually all of today's students, regardless of career choice, will need basic QL skills such as the ability to draw information from charts, graphs, and geometric figures, and the ability to accurately complete straightforward estimations and calculations.

Preliminary efforts to find student work products which demonstrate QL skills proved a challenge in this rubric creation process. It's possible to find pages of mathematical problems, but what those problem sets don't demonstrate 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 evaluator 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 herself, 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 must develop assignments that require students to create work products which reveal their thought processes and demonstrate the range of their QL skills.

This rubric provides for faculty a definition for QL and a rubric describing four levels of QL achievement which might be observed in work products within work samples or collections of work. 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.

Virginia State University General Education QUANTITATIVE LITERACY VALUE RUBRIC

For more information, please contact value@aacu.org

Framing Language

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.

Finally, QL skills can be applied to a wide array of problems of varying difficulty, confounding the use of this rubric. For example, the same student might demonstrate high levels of QL achievement when working on a simplistic problem and low levels of QL achievement when working on a very complex problem. Thus, to accurately assess a student's QL achievement, it may be necessary to measure QL achievement within the context of problem complexity, much as is done in diving competitions where two scores are given, one for the difficulty of the dive, and the other for the skill in accomplishing the dive. In this context, that would mean giving one score for the complexity of the problem and another score for the QL achievement in solving the problem.

Glossary

The definitions that follow were developed to clarify terms and concepts used in this rubric only.

Daily life: identifying quantitative information in daily life involves recognizing data, measurements, and numerical values that provide quantitative insights. Examples include numerical values, time management, units of measurement, statistical data, graphs and charts, budgeting, financial statements, surveys and polls, official records, and quantitative descriptions.

N/A: Not applicable to the assignment. Artifact is not appropriate for the assessment of this SLO.

Virginia State University General Education QUANTITATIVE LITERACY VALUE RUBRIC

For more information, please contact value@aacu.org

Evaluators are encouraged to assign a zero to any work sample or collection of work that does not meet benchmark (cell one) level performance.

| | Exceeds Standard | Meets Standard (Assess @ Reinforce) | Approaching | Introducing (Assess @ Introduce) | Not Evident Or Not Applicable |
|---|--|--|--|---|---|
| | 4 | 3 | 2 | 1 | 0 / N/A |
| <p>Interpretation <i>Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words)</i></p> <p>SLO 3: Interpret equations, graphs, diagrams, tables, figures, and/or words to draw relevant conclusions and make predictions.</p> | <p>Provides accurate and complete explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. <i>For example, accurately explains the trend data shown in a graph and makes reasonable predictions regarding what the data suggest about future events.</i></p> | <p>Provides accurate and complete explanations of information presented in mathematical forms. <i>For instance, accurately explains the trend data shown in a graph.</i></p> | <p>Provides basic explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. <i>For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.</i></p> | <p>Provides partially accurate explanations of information presented in mathematical forms, but frequently makes minor errors related to computations or units. <i>For instance, accurately explains trend data shown in a graph, but may miscalculate the slope of the trend line.</i></p> | <p>Attempts to explain information presented in mathematical forms but draws incorrect conclusions about what the information means. <i>For example, attempts to explain the trend data shown in a graph, but will frequently misinterpret the nature of that trend, perhaps by confusing positive and negative trends.</i></p> |
| <p>Representation <i>Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words) using technological tools.</i></p> <p>SLO 4: Use technological tools to create graphs, tables, figures, and equations from numerical information.</p> | <p>Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding.</p> | <p>Accurately and completely converts relevant information into an appropriate and desired mathematical portrayal using technological tools.</p> | <p>Completes conversion of information, but the resulting mathematical portrayal is only partially appropriate or accurate.</p> | <p>Completes conversion of information, but the resulting mathematical portrayal is inappropriate or inaccurate.</p> | <p>Did not address the established standard. Not applicable to the assignment.</p> |

| | | | | | |
|--|---|--|--|--|---|
| <p>Calculation SLO 5: Calculate basic mathematical operations in problem-solving, such as arithmetic, algebra, and basic statistics.</p> | <p>Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.)</p> | <p>Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem.</p> | <p>Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.</p> | <p>Calculations are attempted but are both unsuccessful and are not comprehensive.</p> | <p>Did not address the established standard. Not applicable to the assignment.</p> |
| <p>Understand <i>Ability to make judgments and draw appropriate conclusions based on the quantitative data in daily life, while recognizing the limits of this analysis.</i> SLO 1: Identify quantitative information encountered in daily life or within the discipline to make informed decisions.</p> | <p>Consistently and effectively identifies a wide range of quantitative information encountered in daily life or within the discipline to make informed decisions, displaying an exceptional ability to discern and analyze data.</p> | <p>Thoroughly identifies patterns, categories, differences, similarities or relevance of quantitative information encountered in daily life or within the discipline to make informed decisions, demonstrating a deep understanding of its significance.</p> | <p>Consistently identifies patterns, categories, differences, similarities or relevance of quantitative information encountered in daily life or within the discipline to make informed decisions. Shows a good understanding of how to recognize and interpret quantitative data.</p> | <p>Occasionally identifies patterns, categories, differences, similarities or relevance of quantitative information encountered in daily life or within the discipline to make informed decisions but lacks consistency. Demonstrates limited understanding of how quantitative data influences decision-making.</p> | <p>Did not address the established standard Not applicable to the assignment.</p> |
| <p>Communication <i>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)</i> SLO 2: Explain numerical information orally or through written communication.</p> | <p>Uses quantitative information in connection with the argument or purpose of the work, presents it in an effective format, and explicates it with consistently high quality.</p> | <p>Uses quantitative information in connection with the argument or purpose of the work, though data may be presented in a less than completely effective format or some parts of the explication may be uneven.</p> | <p>Uses quantitative information but does not effectively connect it to the argument or purpose of the work.</p> | <p>Presents an argument for which quantitative evidence is pertinent but does not provide adequate explicit numerical support. (May use quasi-quantitative words such as “many,” “few,” “increasing,” “small,” and the like in place of actual quantities.)</p> | <p>Did not address the established standard. Not applicable to the assignment.</p> |

