**INQUIRY AND ANALYSIS VALUE RUBRIC**

*for more information, please contact* *value@aacu.org*

**Definition**

Inquiry is a systematic process of exploring issues, objects or works through the collection and analysis of evidence that results in informed conclusions or judgments. Analysis is the process of breaking complex topics or issues into parts to gain a better understanding of them.

**Framing Language**

This rubric is designed for use in a wide variety of disciplines. Since the terminology and process of inquiry are discipline-specific, an effort has been made to use broad language which reflects multiple approaches and assignments while addressing the fundamental elements of sound inquiry and analysis (including topic selection, existing, knowledge, design, analysis, etc.) The rubric language assumes that the inquiry and analysis process carried out by the student is appropriate for the discipline required. For example, if analysis using statistical methods is appropriate for the discipline then a student would be expected to use an appropriate statistical methodology for that analysis. If a student does not use a discipline-appropriate process for any criterion, that work should receive a performance rating of "1" or "0" for that criterion.

In addition, this rubric addresses the **products** of analysis and inquiry, not the **processes** themselves. The complexity of inquiry and analysis tasks is determined in part by how much information or guidance is provided to a student and how much the student constructs. The more the student constructs, the more complex the inquiry process. For this reason, while the rubric can be used if the assignments or purposes for work are unknown, it will work most effectively when those are known. Finally, faculty are encouraged to adapt the essence and language of each rubric criterion to the disciplinary or interdisciplinary context to which it is applied.

**Glossary**

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

• Conclusions: A synthesis of key findings drawn from research/evidence.

• Limitations: Critique of the process or evidence.

• Implications: How inquiry results apply to a larger context or the real world.

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

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|  | **Capstone**4 | **Milestones** 3 2 | **Benchmark**1 |
| **Topic selection** | Identifies a creative, focused, and manageable topic that addresses potentially significant yet previously less explored aspects of the topic. | Identifies a focused and manageable/doable topic that appropriately addresses relevant aspects of the topic. | Identifies a topic that while manageable/doable, is too narrowly focused and leaves out relevant aspects of the topic. | Identifies a topic that is far too general and wide-ranging as to be manageable and doable. |
| **Existing knowledge, research,****and/or views** | Synthesizes in depth information from relevant sources representing various points of view/approaches. | Presents in depth information from relevant sources representing various points of view/approaches. | Presents information from relevant sources representing limited points of view/approaches. | Presents information from irrelevant sources representing limited points of view/approaches. |
| **Design process** | All elements of the methodology or theoretical framework are skillfully developed. Appropriate methodology or theoretical frameworks may be synthesized from across disciplines or from relevant sub-disciplines. | Critical elements of the methodology or theoretical framework are appropriately developed however more subtle elements are ignored or unaccounted for. | Critical elements of the methodology or theoretical framework are missing, incorrectly developed or unfocused. | Inquiry design demonstrates a misunderstanding of the methodology or theoretical framework. |
| **Analysis** | Organizes and synthesizes evidence to reveal insightful patterns, differences, or similarities related to focus. | Organizes evidence to reveal important patterns, differences, or similarities related to focus. | Organizes evidence but the organization is not effective in revealing important patterns, differences or similarities. | Lists evidence but it is not organized and/or is unrelated to focus. |
| **Conclusions** | States a conclusion that is a logical extrapolation from the inquiry findings. | States a conclusion focused solely on the inquiry findings. The conclusion arises specifically from and responds specifically to the inquiry findings. | States a general conclusion that, because it is so general, also applies beyond the scope of the inquiry findings. | States an ambiguous, illogical or unsupportable conclusion from inquiry findings. |
| **Limitations and implications** | Insightfully discusses in detail relevant and supported limitations and implications | Discusses relevant and supported limitations and implications | Presents relevant and supported limitations and implications | Presents limitations and implications, but they are possibly irrelevant and unsupported |

**QUANTITATIVE LITERACY VALUE RUBRIC**

*for more information, please contact value@aacu.org*

**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. 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.

**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.

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

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|  | **Capstone**4 | **Milestones** 3 2 | **Benchmark**1 |
| **Interpretation***Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).* | Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. *For example, accurately explain the trend data shown in a graph and make reasonable predictions regarding what the data suggest about future events.* | Provides accurate explanations of information presented in mathematical forms. *For instance, accurately explains the trend data shown in a graph.* | Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units. *For instance, accurately explain trend data shown in a graph, but may miscalculate the slope of the trend line.* | Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. *For example, attempt 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.* |
| **Representation***Ability to convert relevant information into various**mathematical forms (e.g., equations, graphs, diagrams,**tables, words).* | Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding. | Competently converts relevant information into an appropriate and desired mathematical portrayal. | Completes conversion of information but resulting mathematical portrayal is only partially appropriate or accurate. | Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate. |
| **Calculation** | Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.) | Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. | Calculations attempted are either unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem. | Calculations are attempted but are both unsuccessful and are not comprehensive. |

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| **Application / Analysis***Ability to make judgments and draw appropriate**conclusions based on the quantitative analysis of data,**while recognizing the limits of this analysis.* | Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work. | Uses the quantitative analysis of data as the basis for competent judgments, drawing reasonable and appropriately qualified conclusions from this work. | Uses the quantitative analysis of data as the basis for workmanlike (without inspiration or nuance, ordinary) judgments, drawing plausible conclusions from this work. | Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is hesitant or uncertain about drawing 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 assumptions are 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).* | 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. | 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. | Uses quantitative information, but does not effectively connect it to the argument or purpose of the work. | 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. |

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