Introduction

This file describes how "Quantitative literacy" as a generic competence can be deconstructed into distinct learning outcomes in a university education setting.

It is one of 16 descriptions in LOUIS (Learning Outcomes in University for Impact on Society); LOUIS is part of the Aurora Competence Framework.

The descriptions are based on the VALUE Rubrics developed by the American Association of Colleges & Universities AAC&U.

Quantitative Literacy (or Numeracy or Quantitative Reasoning) is a "habit of mind," competency, and comfort in working with numerical data.

Individuals with quantitative literacy 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 components:

- Interpretation
- Representation
- Calculation
- Application/ Analysis
- Assumptions
- Communication

Quantitative literacy : Interpretation

Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means.

Provides somewhat accurate explanations of information presented in mathematical forms, but occasionally makes minor errors related to computations or units.

Provides accurate explanations of information presented in mathematical forms.

Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information.

Quantitative literacy : Representation

Completes conversion of information but resulting mathematical portrayal is <u>inappropriate</u> or inaccurate.

Completes conversion of information but resulting mathematical portrayal is only <u>partially</u> appropriate or accurate.

<u>Competently</u> converts relevant information into an appropriate and <u>desired</u> mathematical portrayal.

<u>Skillfully</u> converts relevant information into an <u>insightful</u> mathematical portrayal in a way that contributes to a further or <u>deeper</u> understanding.

Quantitative literacy

Calculation

Calculations are attempted but are <u>both</u> unsuccessful and are not comprehensive.

Calculations attempted are <u>either</u> unsuccessful or represent only a portion of the calculations required to comprehensively solve the problem.

Calculations attempted are essentially all successful <u>and</u> sufficiently comprehensive to solve the problem.

Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented <u>elegantly</u> (clearly, concisely, etc.)

Quantitative literacy: Application / analysis

Uses the quantitative analysis of data as the basis for <u>tentative</u>, basic judgments, although is <u>hesitant</u> or uncertain about drawing conclusions from this work.

Uses the quantitative analysis of data as the basis for <u>workmanlike</u> (without inspiration or nuance, ordinary) judgments, drawing <u>plausible</u> conclusions from this work.

Uses the quantitative analysis of data as the basis for <u>competent</u> judgments, drawing reasonable and appropriately <u>qualified</u> conclusions from this work.

Uses the quantitative analysis of data as the basis for deep and <u>thoughtful</u> judgments, drawing <u>insightful</u>, carefully qualified conclusions from this work.

Quantitative literacy: Assumptions

Attempts to describe assumptions.

Explicitly describes assumptions.

Explicitly describes assumptions and provides compelling rationale for why assumptions are appropriate.

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.

Quantitative literacy: Communication

Presents an argument for which quantitative evidence is pertinent, but does <u>not provide</u> adequate explicit numerical support. (May use quasi-quantitative words such as "many," "few," "increasing," "small," and the like in place of actual quantities.)

Uses quantitative information, but does <u>not effectively</u> connect it to the argument or purpose of the work.

Uses quantitative information in connection with the argument or purpose of the work, though data may be presented in <u>a less than</u> completely effective format or some parts of the explication may be uneven.

Uses quantitative information in connection with the argument or purpose of the work, presents it in an <u>effective</u> format, and explicates it with consistently high <u>quality</u>.