

Core Concept: Data Collection, Analysis, & Communication

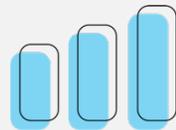
Engineering Literacy Dimension: Engineering Practices

Practice: Quantitative Analysis

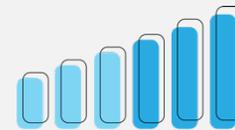
Overview: *Data Collection, Analysis, & Communication* is the process of gathering, recording, organizing, examining, interpreting, and sharing data from a variety of sources, such as experiments, design calculations, economic analyses, and statistical procedures, throughout an engineering project. Sophistication in this process requires knowledge related to (a) *data collection techniques*, (b) *using data to inform decisions*, (c) *data visualization*, (d) *estimation*, and (e) *appropriately reporting data to the designated audience*. Data Collection, Analysis, & Communication is important to the practice of Quantitative Analysis as engineering professionals collect, organize, and analyze quantitative data to understand and solve a problem as well as regularly communicate information about the results of their work with their clients and invested stakeholders.

Performance Goal for High School Learners

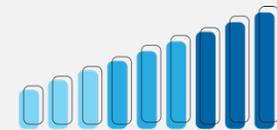
I can successfully select and implement the most appropriate method to collect and analyze quantitative data and then make, justify, and share a conclusion based on the analysis.



Basic



Proficient



Advanced

DATA COLLECTION TECHNIQUES

I can identify the type of data needed (e.g. numerical or categorical) and the data collection method that would be most appropriate (e.g. survey, experiment, or observation).

I can analyze a situation in which data collection is needed and develop a plan for collecting the data through the most appropriate method (e.g. survey, experiment, or observation).

I can collect the data I need through the implementation and execution of appropriate data collection procedures.

DATA-DRIVEN DECISIONS

I can identify the type of quantitative analysis (e.g. t-tests, chi-square tests, analysis of variance, etc.) that would be most appropriate in order to make a data-driven decision.

I can organize and analyze collected data using a selected method of quantitative analysis (e.g. t-tests, chi-square tests, analysis of variance, etc.) in order to make a data-driven decision.

I can develop a hypothesis and verify it through the analysis of collected data in order to make a conclusion.

DATA VISUALIZATION

I can identify which type of tables, graphs, charts, or plots will be most effective and efficient in describing the collected data and analysis results.

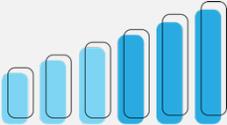
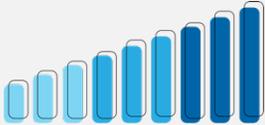
I can explain and demonstrate how to build basic pictorial graphs (e.g. pie, column, or bar graphs) in order to illustrate data that has been entered or imported into data visualization software.

I can explain and demonstrate how to build complex two-dimensional and three-dimensional graphs with data visualization software that can be used for interpolation, extrapolation, and determination of mathematical relationships.

Core Concept: Data Collection, Analysis, & Communication Cont.

Performance Goal for High School Learners

I can successfully select and implement the most appropriate method to collect and analyze quantitative data and then make, justify, and share a conclusion based on the analysis.

	 Basic	 Proficient	 Advanced
ESTIMATION	I can identify which type of estimation (e.g. interval estimation and point estimation) would be most appropriate to predict an unknown population parameter.	I can analyze a given data set and develop a plan for making estimates.	I can deduce a conclusion through the use of estimates and provide support using quantitative data.
REPORTING DATA	I can identify key components that should be reported when communicating the results of a quantitative data analysis.	I can collaboratively create a complete poster, paper, or oral presentation involving the research question or problem statement, the methods and procedures used to collect and analyze the data, the analysis results, and the final conclusions.	I can create and deliver a complete poster, paper, or oral presentation involving the research question or problem statement, the methods and procedures used to collect and analyze the data, the analysis results, and the final conclusions.