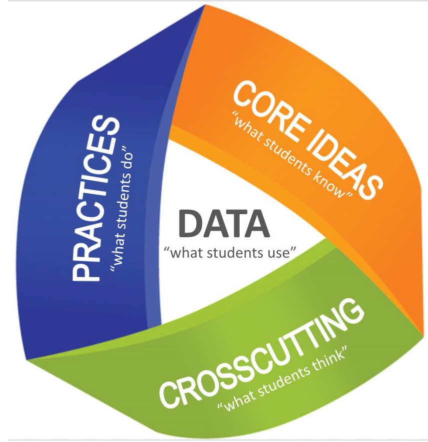
The Data Literacy Company

Turning Data into Evidence: Where Science Standards & Data Meet

Where does data fit into science learning? Every place your students do science!

Whether you work in a state that is adopting the Next Generation Science Standards (NGSS) or working with your own state's science standards (e.g., Texas Essential Knowledge & Skills), data is integral to successfully achieving science instruction to prepare our students for the 21st century.



As science educators, we wear two important hats. We need to teach our students about: (1) *what* we have already learned about how the natural world works, as well as (2) *how* we learned that information and how many questions are still unanswered, by engaging them in the process of science. Data is integral to both aspects of science teaching. We can use data to support the content of what is already known, *and* have the students use data to answer our questions (and their own) as they engage scientifically in their learning.

Using data to learn science content and investigate scientific questions, maps readily to the NGSS structure. Students use data when they do or take part in the Practices of science and think about the Crosscutting Concepts to learn the Core Ideas we are covering in a unit.

But what does *using data* actually look like in our classrooms? This is where thinking more specifically about the practices or processes as outlined in your standards come into play.

Again, let's use the NGSS as an example to explore where data meets science practices.

Practice of Science	**What role does data play in this practice?**
Asking Questions	When asking questions in science, we seek to: ● Understand characteristics of populations, systems, and phenomena. ● Compare and contrast categories/populations/ systems/phenomena.

TUVA LABS INC.
www.tuvalabs.com
@tuvalabs
hello@tuvalabs.com
+1.646.481. 2150

	• Investigate relationships between or among characteristics or variables. • Explore probability of responses related to our questions (rather than determining the exact response) by taking into account natural and measurement variability in data.
Developing & Using Models	When developing and using models in science, we: • Use graphical representations to model relationships • Create mathematical representations of phenomena to better understand and/or predict their functioning • Use data as inputs and outputs for computer simulations of phenomena • Account for accuracies and limitations of the model to represent the phenomena
Planning & Carrying out Investigations	When planning and carrying out investigations in science, we: • Determine what data are needed to answer our specific question. • Decide how the data should be collected, organized, summarized, and displayed as evidence to answer our specific question.
Analyzing & Interpreting Data	When analyzing and interpreting data in science, we: • Visualize data in a variety of ways to look for patterns and relationships. • Interpret graphed data in terms of our question to determine our claim. • Reason about what data mean in a wider context, and how strongly the data supports our hypothesis or claim.
Using Mathematics & Computational Thinking	When using mathematics and computational thinking in science, we: • Use mathematical functions (e.g., frequencies, percentages, ratios, proportions, rates) to summarize and compare categories, populations, and phenomena • Describe a group in terms of statistical attributes (e.g., spread, shape, and center). • Draw from existing data to make predictions based on probability. • Run models and simulations and evaluate them according to real measurements. • Describe relationships between variables in a dataset mathematically to help determine levels of certainty in results and claims.

Constructing Explanations	When constructing explanations in science, we: • Clarify how patterns support or refute a claim. • Convey what a graph shows as reasoning for the claim. • Account for patterns in data as part of the claim.
Engaging in Argument from Evidence	When engaging in argument from evidence in science, we: • Make claims about our data (and data presented by others). • Use reasoning about what components of our (and other's) data are the evidence to support or refute a claim. • Evaluate uncertainty and/or potential bias in our (and other's data) as it relates to a claim.
Obtaining, Evaluating, & Communicating Information	When obtaining, evaluating and communicating information in science, we: • Transform tabular datasets into coherent information and evidence-based ideas. • Visualize and present data graphically. • Write about data in descriptions, explanations, and interpretations. • Converse about data to build scientific ideas and understanding.