The Need for Data Literacy

My NASA Data (MND) recognizes the importance of data literacy, especially in the Earth Sciences because data are the foundation of science. But what does data literacy look like?

Data-literate people are able to understand, explain, and document the use and limitations of data. They find meaning in data and make informed actions based on it. These citizens collect their own data, identify data based on key characteristics, analyze, interpret, and present data. They also know how to protect data.

21st Century students must develop the skills to solve the complex problems facing their generations. As outlined in the 2018 Executive Plan for building American STEM education (Office of Science and Technology Policy), our classrooms must provide opportunities for students to grow their analytical and critical thinking skills with statistical methods so that they can understand the problems that need solving. MND offers resources and tools to help teachers integrate this computational thinking using NASA Earth science visualizations, data, and more!

Let My NASA Data Help!

At MND, we provide resources to help learners analyze and interpret real-world Earth science data, one of the eight science and engineering practices. Coupled with the skill of constructing explanations based on evidence, MND is a platform to help students access the evidence they need to make evidence-based decisions about changes in the Earth System.

IBM claims that over 90% of ALL data in the world was created since 2012 and quintillion bytes of data are created every day. No matter if the data collected from a personal fitness device, sensors in homes or offices, or payloads orbiting the Earth continuously collecting data, *big data is here to stay*. NASA guarantees that no matter what careers your students take, data analysis and interpretation will be an important skill to have. Let MND help you!

Educators, consider using the My NASA Data Literacy Cube to guide students' exploration of graphs, maps, and datasets to enrich their observations and inferences.

Data Literacy Cube set:

- **Cube Template:** Within this guide, you will find a black-line master template for one cube. (Unlike the earlier versions, this guide includes only one cube.) This template is intended to be constructed for use with the question sheets. Alternatively, gaming dice or virtual dice rollers may be substituted for the cube.
- **Question Sheets -** This guide has three different sets of questions that educators may use with different types of data visualizations commonly used in Earth/environmental science classrooms: maps, graphs, and data tables. See their related icons below. Do you have your own set of maps, line charts, or data tables that you use with students? Do you pull charts and maps from the textbook for students to analyze? Do you have them create and analyze their own data visualizations? If your answer was "yes" to any of these questions, try these question sets!

- Once you know what kinds of data you are working with, the next task is identifying the needs of your students. Are you working with elementary students? **No problem!** Working with AP Environmental students? **No problem.** Working with students anywhere in between? **No problem!**
    - Each question set has four leveled question sheets to help you differentiate your instruction and each are leveled for both Lexile and English-language proficiencies. The sheets are provided in labeled and unlabeled versions for educators to use at their discretion. See the bottom right of the labeled question sheets for the designations of the levels.
        - **Novice** (Lexile Levels - 200-400) (WIDA proficiency level suggestions: 1.5-2.5)
          -Intended Audience: elementary students, struggling learners, ELL's, and students with specific accommodations.
        - **Developing** (Lexile Levels - 210-400) (WIDA proficiency level suggestions: 1.9-2.5)
          -Intended Audience: elementary students, struggling learners, ELL's, and students with specific accommodations.
        - **Proficient** (Lexile Levels - 410-600) (WIDA proficiency level suggestions: 2.5-4.5)
          -Intended Audience: students who require reading supports, and those whose sentence and word phrase dimensions are more advanced.
        - **Advanced** (Lexile Levels - 610-800) (WIDA proficiency level suggestions: 4.5-6)
          -Intended Audience: fluent English speakers, academically advanced learners, and abstract thinkers.
- **Keyword List** - A list of keywords is included on various question sheets. It provides the teacher and learner with opportunities to document key vocabulary words that are incorporated in the data analysis prior to starting the activity. Some words have been included in the list, but space is provided for those who wish to add additional words that are important in the lesson.

- **Task Card** - The Task Cards provide roles for students to perform while conducting the data analysis. This allows students to specialize in an area of data analysis and recording while contributing to the team. (This is a great way to also include multilingual and other learners.)

Source:

- Charting a Course for Success: America's Strategy for STEM Education (2018)

Teacher Resources:

- Partners in Data Literacy (formerly the *Maine Data Literacy Project)*
- Michigan State University's Data Nuggets