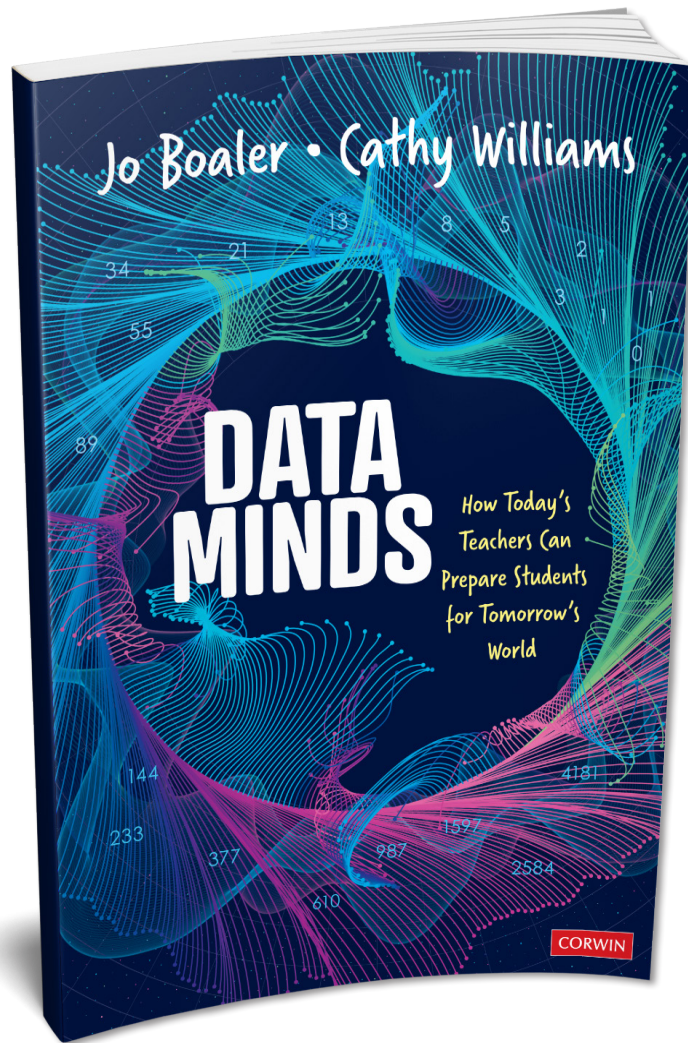




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Visualizing Data

We did not know what to expect as students moved into their groups, excitedly gathering colored pencils and poster paper. The class had only been together for 2 weeks, and the challenge of groups collaborating effectively to choose their approach to data visualization would be hard for adults, let alone fourth graders. Later in the year we would expect to see groups working well together, collaborating with respect and care for each other, but it was early days for such important norms to have

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been instantiated. We wondered if groups could focus on different variables, and the ways the variables related to each other, or whether that required greater maturity than a fourth grader could have developed. Sarah had questions too, but she was willing to take a risk, knowing that it is inside these risky, messy classroom interactions that creativity, and student responsibility, often emerges (Figures 2.7 and 2.8).

FIGURE 2.7 Students Collaborating in Sarah's Class



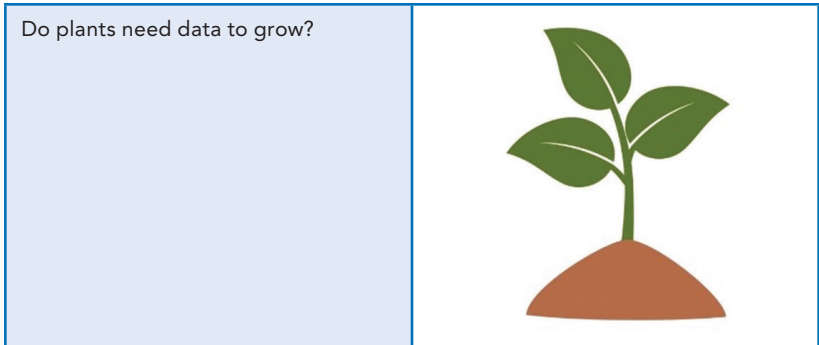
FIGURE 2.8 A Student Works on Her Data Visual Poster



Sarah interrupted the groups only once, to share that what she was seeing was “really cool” and that she was impressed, adding that it is important to make sure their key was easy to use and that someone could understand their data from the key.

The students worked on their data visuals in groups for about an hour, totally engaged the whole time. Sarah walked around and visited each group. After some time, Sarah decided it would help the students to share where they were, and they gathered at the front of the room ready to show their posters and their results. Some of the students were so excited they found it hard to stay seated, bobbing up and down excitedly. As students squeezed into the available floor space, a young girl, Maya, approached Sarah and the two of us, with a puzzled look on her face, and asked a question:



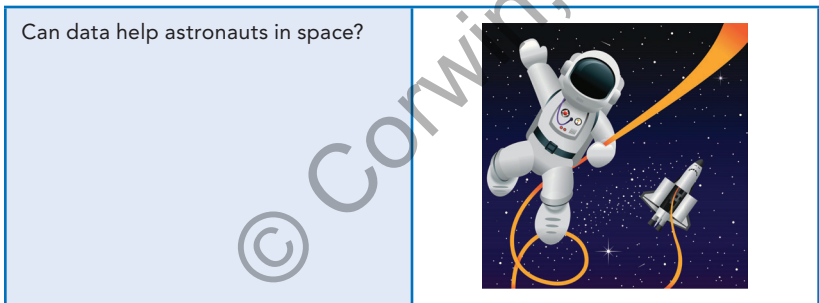


Source: [istock.com/Olga Nazhiganova](https://www.istock.com/Olga-Nazhiganova).

At first, we were taken aback by Maya’s question, one that came from pure curiosity and interest; we had to take a moment to think. Maya continued: “Because when plants start as a seed, don’t they need to know how to grow and what direction to grow?”



We loved this question, which came from Maya’s interest in plants. Paulo overheard and approached with his own question:



Source: [istock.com/roccomontoya](https://www.istock.com/roccomontoya).

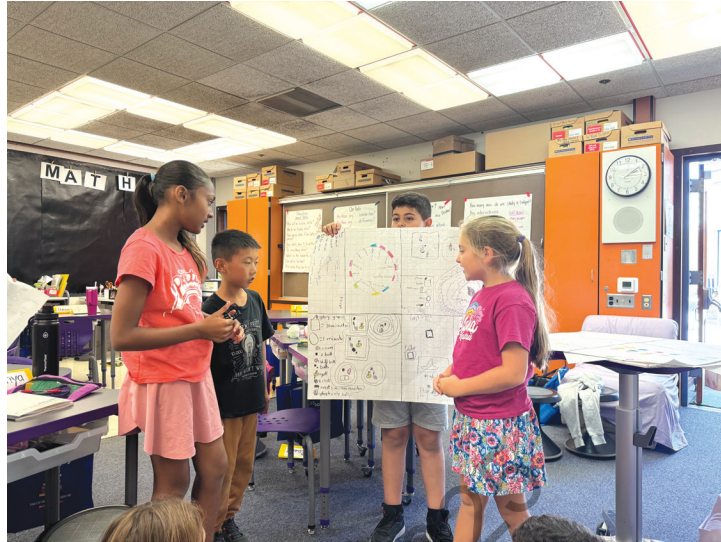
This lesson, and these questions, indicate that the students, and the rest of the class, had become **data aware**. Just knowing about data in the world had piqued their curiosity, which drew from their own personal interests. Listening to the excited students talk about data that day, it was hard to believe that two days prior, the students had very little idea of what data was, and many thought it was just something a computer used.

Sarah called the groups to the floor of the classroom, and when they had settled Sarah invited students to present their ideas to each other. All of the student posters used shapes, colors, and objects to show different variables (Figure 2.9).

Data aware:
a phrase used to mean a new awareness that the world is filled with data, often accompanied by curiosity about the data in the world.

Listening to the excited students talk about data that day, it was hard to believe that two days prior, the students had very little idea of what data was.

FIGURE 2.9 Four Students Present Their Data Visuals



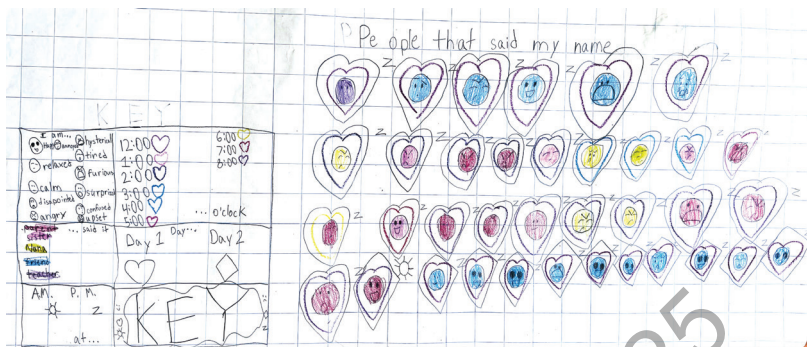
One group that was recording drinks represented their data as a bottle, filling up with different drinks. The visual used color to show types of drink, different shadings to show whether they had the drinks with food, and times to show the time of the drink (Figure 2.10).

FIGURE 2.10 Student Data Visual: What We Drank



The group that recorded their name being called showed who called their name, the time of the name calling, and how it made them feel, using hearts to capture their feelings (Figure 2.11).

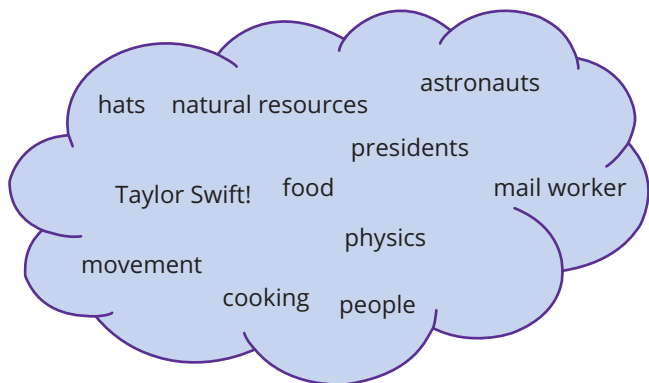
FIGURE 2.11 Student Data Visual: People That Called My Name



As each group presented its data visual, Sarah artfully chose a data point on each students' visualization and read it aloud, to check her understanding, saying, for example, "So this tells me that at 3:30 you had blueberry drink, without food?" Each time the students confirmed Sarah's reading of their data.

The class ended with a discussion of data in general. Sara revisited the question she had asked two days ago—What is data? Recall that before the lesson students had answered the question by saying data was something a computer used. The first answer Sarah received after the lesson was "Data is amazing!" Sarah responded thanking the responding student, James, for his enthusiasm, asking the students to give more specifics. The students shared many examples of situations that could include investigative questions of data (Figure 2.12).

FIGURE 2.12 A Word Cloud of Suggested Data Questions



Much was achieved during the three days students worked on their data investigations. Sarah's message to them—you are mathematicians who go out and collect data on the world—started their data awareness by inviting them to have agency in the data literacy process. Importantly,



Sarah's students were encouraged to develop an aspect of data minds—a habit of mind—of being a questioner.

It is hard to overestimate the importance of teaching students they can ask questions, but this habit of mind is one that often declines as students move through school. In the Dear Data lesson, students



were not only invited to ask questions but also to ask questions about their own lives. Implicitly they were being asked to find a way to capture some of the variability in the world. This led them to develop a second disposition of curiosity.



Importantly, Sarah began the project by asking her students' open questions—showing students data visuals and asking them what they



wondered, and what they saw in the data. This act of asking students their wonderings is a natural way of making content meaningful to students. When the students' responded Sarah was genuinely curious about students' ideas. Sarah has been teaching for 27 years but has never lost her inquisitiveness about students' thinking—her genuine interest in students' thoughts shines through all her interactions with the students. This quality that Sarah brings to her teaching is important to the data literacy process. The interest and respect Sarah shows encourages the young students to take risks and to let their own natural curiosity take root. A critical part of developing students' data minds starts with people wondering about situations, asking questions, and seeking data. As the students wonder about the variability in the world, they become curious, and they learn to develop and act on their curiosity with data.

Data Teaching Moves!

Throughout this book we highlight valuable “data teaching moves.” These are actions teachers take to highlight data, and to encourage students learning about data. All the teaching moves are important, but some data lessons focus on some moves more than others. In the Dear Data lesson Sarah enacted five data teaching moves.