

Thinking with Data in the Classroom

Data is more than just numbers, and thinking with data is not limited to mathematics. Data can be observational records or interviews as well as statistical information. Thinking with data is an important component of all subject areas. Whether students are conducting historical research on their neighborhood, analyzing the demographic trends of their school, or interpreting a work of literature, students must think systematically about different kinds of evidence and draw conclusions about what they have discovered. They must also communicate their methods and their findings to others. Students can apply data analysis tools in all their classes and in their lives to create models to describe and reason about real-world situations.

Students learn to think with data, first, by working on projects that require the collection, analysis, and interpretation of data. They need opportunities to practice their skills in a variety of contexts throughout the day. Research is clear, however, that mere exposure to tasks that require this kind of thinking does not on its own have a significant impact on students' thinking abilities (Beyer, 2000; Swartz, 2000). Those skills must be taught through modeling, guided practice, and training.

When students work on projects that require thinking about and with data, teachers must identify the specific skills students will need to exercise at different stages of the project. These skills, such as identifying patterns, drawing conclusions, and communicating mathematical processes, can be taught through modeling the skills and strategies necessary to complete specific tasks. As students use their new skills to work with data in meaningful projects, teachers assess their proficiency informally, and follow up when necessary with additional instruction and modeling.

In classrooms where thinking with data is a regular part of instruction, students and teachers question their conclusions by asking questions:

- What evidence supports your point of view?
- Where did you find this evidence?
- Do you have all the relevant evidence?
- What methods did you use to reach your conclusions?
- Why did you interpret the facts the way you interpreted them?

When this kind of thinking becomes part of regular classroom processes, students learn to see thinking with data as a tool that can help them make informed decisions.