Skills Used in Thinking with Data

Thinking with data is a specific type of thinking that includes many 21st century skills, particularly problem solving, critical and systems thinking, creativity, and communication. Thinking with data also frequently involves collaboration and self-direction.

Students who think with data engage in multiple complex thinking skills. These students:

- Analyze, interpret, and make sound inferences from data
- Extract implications and conclusions from data
- Create and apply criteria to gauge the strengths, limitations, and value of information and data in productive ways
- Form and communicate conclusions that are based in evidence and statistical literacy

In the context of a fast-paced, knowledge-based society, thinking and reasoning with data requires both divergent and convergent thinking.

Divergent thinking requires creativity to answer the question, "What if?" In divergent thinking, students establish multiple scenarios and ideas that they can consider when they create statistical questions to pursue, or analyze and make inferences about data. It encourages students to look at data from various viewpoints.

Convergent thinking enables students to use sound reasoning and common sense to analyze data from multiple perspectives. This type of thinking allows students to select the statistical question with the most potential based on a set of criteria.

Thinking with data is not a single event. In fact, thinking with data can be thought of as a five-stage process:

1. Forming a solid statistical question
2. Collecting appropriate and unbiased data
3. Analyzing and interpreting data
4. Evaluating and synthesizing data
5. Forming and communicating conclusions (Friel & Bright, 1998)

Thinking and reasoning intelligently about data moves students beyond the graphing and data-collection skills that they typically experience in classrooms (Konold & Higgins, 2003). Students also need to develop proficiency in communication, collaboration, and reasoning skills.