By Jane Krauss

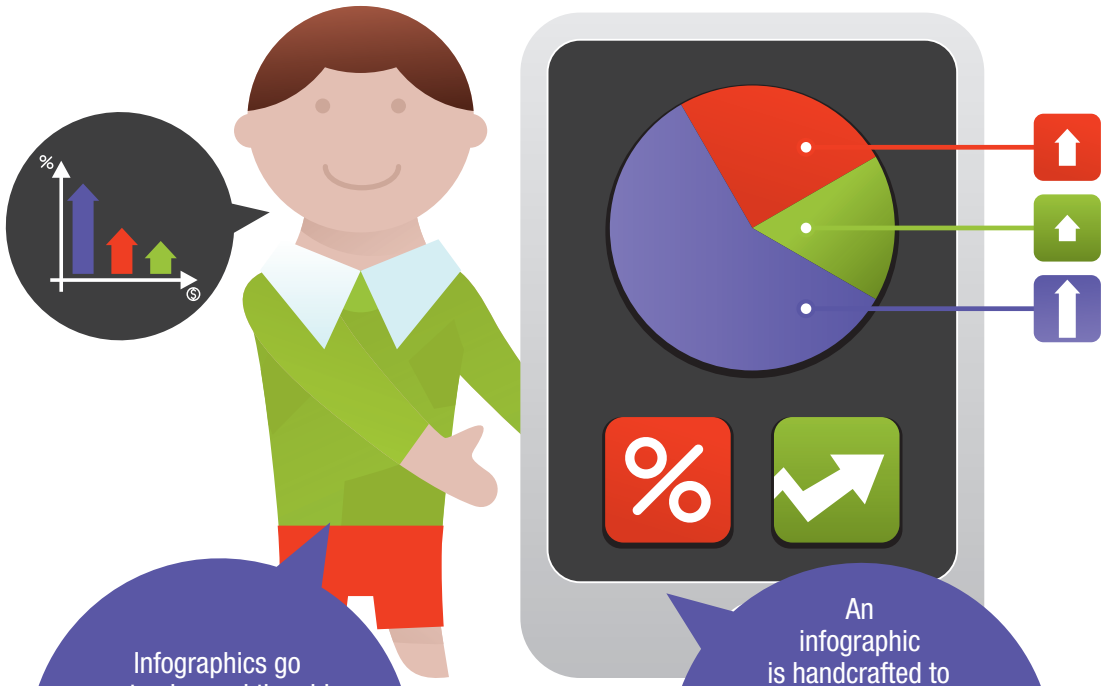
More Than Words Can Say Infographics

Good learning experiences ask students to investigate and make sense of the world. While there are many ways to do this, K–12 curriculum has traditionally skewed toward reading and writing to interpret and express students' sense-making. But there is another way. Infographics represent data and ideas visually, in pictures, engaging more parts of the brain to look at a problem from more than one angle.

Infographics ask for an active response from the viewer, raising the questions, "What am I seeing?" and "What does it mean?" As the old adage goes, a picture is worth 1,000 words, and pictures can be essential when complexity demands more than words can say.

What Is an Infographic?

Simply put, infographics are visual displays of information.



Infographics go a step beyond the old-fashioned graphics—charts, timelines, tables, and graphs—created by simply applying a computer program to a few like data sets.

An infographic is handcrafted to bundle related data sets into a unified, visually compelling representation. The juxtaposition of those sets of information relates a more complex story.

ISTOCKPHOTO.COM/BUSIMARUSI

Meet the Standards

Most subject-matter standards give attention to sense-making and information literacy, both of which students develop when they interpret and design infographics.

The NETS for Students address skill sets that include the interpretation and creation of infographics. The NETS' Creativity and Innovation indicators include creating original works and using models, its Communication and Collaboration indicators speak to communicating information and ideas using a variety of media, and the Research and Information Fluency section refers to processing data and reporting results using a variety of tools.

iste.org/standards/nets-students

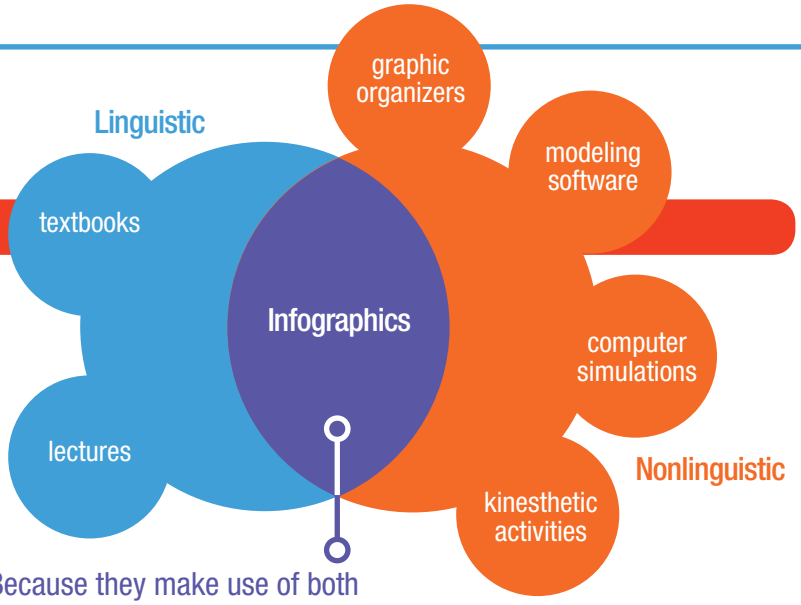
The "anchor standards" in the Common Core State Standards define college and career readiness, in part, as the ability to "integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words."

www.corestandards.org

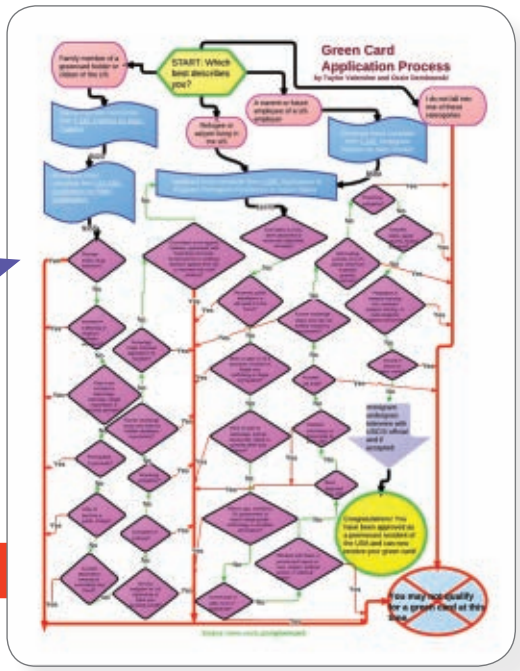
Boost Comprehension

Robert Marzano
www.marzanoresearch.com

Education researcher Robert Marzano confirmed that learners acquire and store knowledge though linguistic systems, which they use when they read or listen to lectures, and nonlinguistic systems, which they tap to process computer simulations and kinesthetic activities. The more students use both systems, the better they are able to store, recall, and apply new understandings.



Because they make use of both words and visuals, infographics strike the sweet spot where linguistic and nonlinguistic systems converge.



This green-card application flowchart (http://tinyurl.com/7tbomzh), created by high school seniors from the Science Leadership Academy, follows the "if-then" rule of BASIC programming, a computational thinking concept.

Teach Computational Thinking

Much of the mental processing that goes into the development of infographics has parallels in computational thinking (CT), the thinking patterns that computer scientists use to solve problems. CT skills have value beyond computer science, as they help us approach problems and apply processes to solve them. CT can help students practice with data sets of any size, manipulate that data, and represent it in an infographic. For example, students can collect statistics about their friends' Facebook connections, analyze the data, and present their findings graphically.

Recent technological advances have led to an explosion of available data, allowing students and teachers to access a much wider variety of real-time statistics on such topics as weather patterns, deforestation, and population movements. CT is essential for working with these large data sets and creating infographics to help analyze them. Imagine how your students might use CT skills to collect, process, and render raw data into infographics, with or without the aid of computer programs.

For more information about computational thinking, visit iste.org/computational-thinking.

Teaching Infographics

Lesson Plans

Does your curriculum ask students to engage in analysis and interpretation to derive meaning? You can use infographics as a tool for developing these capabilities in your students, both when they interpret the graphics and when they create them.

Interpret

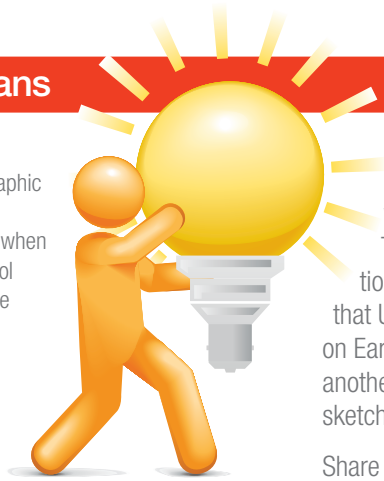
- Present infographics that ask students to make sense of dynamic systems, relational data, or change over time.
- To build their critical faculties, present both good and bad charts, graphs, and infographics for students to examine.
- Part of information literacy is being alert to the intentions of the person or group that puts forth the information. Help students determine when statistics reflect value judgments, are presented in a distorted scale, or lie in other ways.

Create

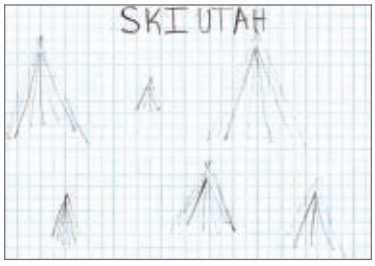
- By making infographics, students learn that the ways they represent data are as important as the data they collect.
- Students learn how to make sense of statistical data by representing the important features of a data set and the relationships between data sets.
- Teach students that in the pictorial "narratives" of their infographics, the data have to be valid, and the representation has to be true.

Research has shown that, of the sensory receptors in our body, 70% reside in our eyes.

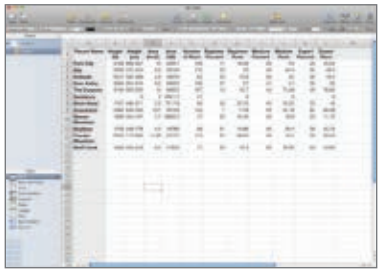
The Ski Utah infographic below, created by Michael Greenberg when he was a high school senior, gives a sense of how a single infographic can represent multiple data sets.



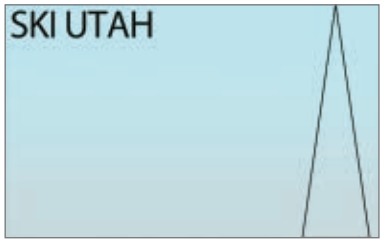
Step One: Get an idea.



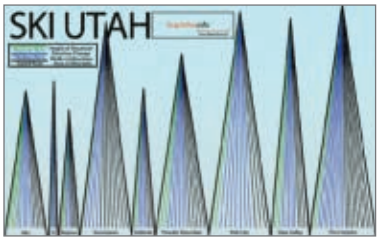
Step Two: Sketch it out.



Step Three: Collect the data.



Step Four: Develop proof of concepts.



Step Five: Lay it out and have fun.

Introduce Infographics

Ask your students to pretend they work for the Utah tourism bureau. Their charge is to design a promotional poster that will convince visitors that Utah's slogan, "The Greatest Snow on Earth," is true. Let them talk to one another and noodle around a bit with sketches.

Share Michael Greenberg's Ski Utah infographic. Display an enlarged view from his Graph the Info blog at www.graphthe.info.

Ask students what they learned about skiing in Utah from Greenberg's pictorial representation. Encourage them to examine the legend, which describes an unusual representation of area. Ask what they can infer about the mountains that may get the most and least business. Ask them to make conjectures about how many data sets the infographic represents and how Greenberg derived them.

Ask how they could represent other data of interest to someone contemplating a Utah ski vacation, such as the distance from the airport or winter temperatures.

Together, read what Greenberg writes on his blog about the five-step process he used to create the Ski Utah infographic.

The National Council of Teachers of Mathematics recommends that students at every grade level undertake investigations in which they collect and represent data graphically.

Solve a Problem

A middle school class is studying livability in their town. After a student's grandmother breaks her hip on a broken sidewalk, a project emerges that asks students to respond to the question: "Can everyone get where they need to go?"

Students notice that many sidewalks are broken, making them impassable for people using strollers, wheelchairs, walkers, and canes. They notice that trash cans and cars block bike lanes. They begin to survey their neighborhoods, recording their neighbors' mobility challenges and identifying the worst impediments.

Imagine the data they can collect. How might they present their information pictorially to tell a story and make the case for resolving these problems? What might their infographic look like? Who might the audience be for a persuasive appeal that incorporates the infographic?

Government Function

In Diana Laufenberg's 12th grade social studies class at the Science Leadership Academy in Philadelphia, Pennsylvania, USA, students learn about U.S. government functions managed by the executive branch. Laufenberg has her students interact with federal functions as anyone might who navigates a bureaucratic process. They "apply" for federal student aid or a green card. They make a request permitted by the Freedom of Information Act. Along the way, they analyze each process, make a pictorial representation of that process, and recommend ways it might be improved. By approaching what they are learning from many different angles—including participating in real-world tasks and creating infographics—their understanding of the myriad ways that citizens interact with the government is much deeper and more memorable than it would be if they had just read about it and written a report.

More Lesson Plan Ideas

Imagine students pondering:

- An interactive map showing the percentage of family income that goes toward food in countries around the world
- A visualization of time-travel plots in films and TV
- An infographic that represents the largest bankruptcies in history by showing insolvent companies as sinking ships of relative size

Simple Rules for Making Infographics

Tell a story. Supply a context for the information you are trying to present with titles, pictures, a legend, or even a key question, such as, "How well do citizens in our town get around?"

Be clear. If someone can't tell how different elements contribute, it's back to the drawing board.

Use good data. Use only "fresh" data from reliable sources. This includes data you may have collected yourself!

Pay attention. As you move through the world, you'll notice infographics everywhere. Look at each and think about how it might be a launching pad for learning in your classroom. Encourage students to bring infographics to your attention too. As you and your students become infographic literate, you'll want to start creating infographics of your own.

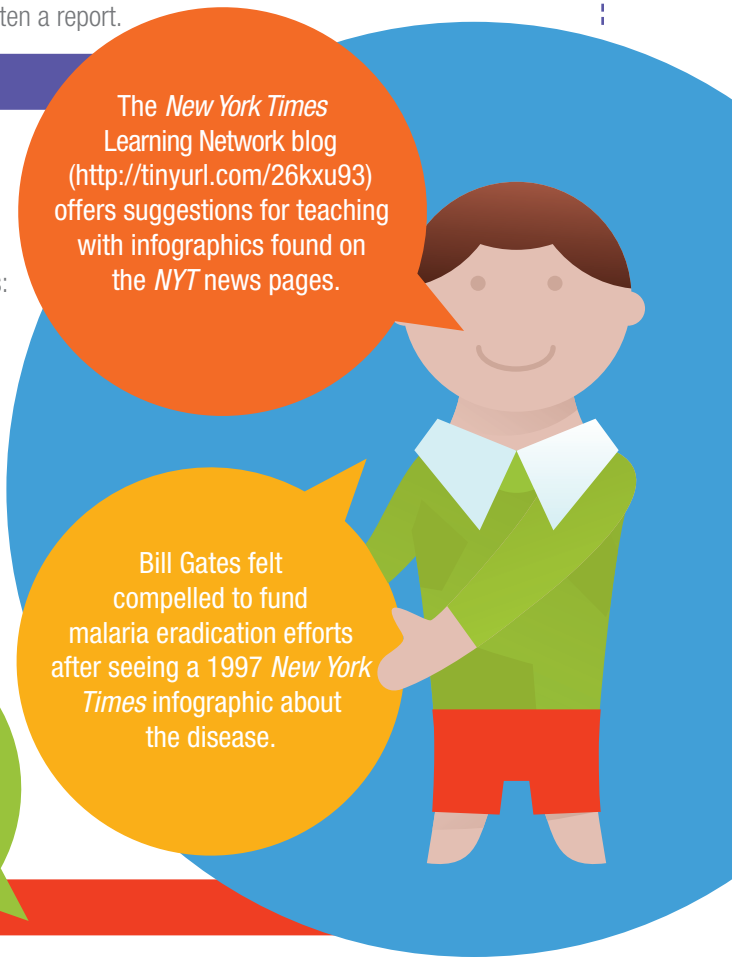
More Rules

Several sets of guidelines are available to help students represent data accurately and convincingly with infographics:

Atlantic Magazine Online
www.theatlanticwire.com/technology
Search for *rules for homemade infographics.*

Flowing Data
www.flowingdata.com
Search for *simple design rules.*

The *New York Times* Learning Network blog (http://tinyurl.com/26kxu93) offers suggestions for teaching with infographics found on the *NYT* news pages.



Bill Gates felt compelled to fund malaria eradication efforts after seeing a 1997 *New York Times* infographic about the disease.

The *Oxford English Dictionary* added the term *infographic* in 2011.

Infographic Resources

Good Data Sources

CIESE Real-Time Data Projects: www.ciese.org/realtimeproj.html
Google Public Data Explorer: www.google.com/publicdata/home
Jane Krauss' list of bookmarked infographics: www.delicious.com/jkrauss/infographics
United Nations Statistics Division: http://unstats.un.org/unsd/default.htm
Wolfram Alpha Computational Knowledge Engine: www.wolframalpha.com

Infographic Sources

Cool Infographics: www.coolinfographics.com
Floating Sheep: www.floatingsheep.com
Flowing Data: http://flowingdata.com
GapMinder: www.gapminder.org
GOOD/Transparency: www.good.is
Infographics Showcase: www.infographicsshowcase.com (author grades infographics on information and display qualities)
Information Aesthetics: http://infosthetics.com
Information Is Beautiful: www.informationisbeautiful.net
The *New York Times* Learning Network: http://learning.blogs.nytimes.com

Tools for Creating Infographics

For Purchase

Adobe Illustrator: www.adobe.com/products/illustrator.html
Adobe InDesign: www.adobe.com/products/indesign.html
Adobe Photoshop: www.adobe.com/products/photoshop.html
Lucid Chart: www.lucidchart.com

Free Online

Google Spreadsheets: www.google.com/google-d-s/spreadsheets
Inkscape: http://inkscape.org
Many Eyes: www-958.ibm.com/software/data/cognos/manyeyes
Rhino 3D: www.rhino3d.com
Science Pipes: http://sciencepipes.org/beta/home
Tableau Public: www.tableausoftware.com/public
Visual.ly: http://visual.ly/labs

On Hand

Graph paper
Presentation software (Powerpoint, Keynote)
Protractors and compasses
Spreadsheet software (Excel, Numbers)

Sources for infographics abound. Make their interpretation one of the regular ways you bring the outside world into your classroom.

Infographics Gurus

For a little infographic inspiration, check out these people:

Edward Tufte (www.edwardtufte.com) has one simple but powerful idea: Represent as much data as possible with as little ornamentation as possible. Let the data speak for itself.

Nathan Yau (http://nathanyau.com) plays with data. His focus is on visualization and data for non-professionals, and he blogs about statistics and visualization at FlowingData (www.flowingdata.com).

David McCandless (www.davidmccandless.com) has a passion for visualizing information—facts, data, ideas, subjects, issues, statistics, and questions—all with a minimum of words. He is interested in how designed information can help people understand the world by revealing its hidden connections, patterns, and stories.

Hans Rosling (www.gapminder.org) uses visualization software he developed to animate observations about broad social and economic trends. A professor of global health at Sweden's Karolinska Institute, Rosling uses infographics to dispel common myths about the developing world.

Jane Krauss, a past director of professional development at ISTE and co-author of *Reinventing Project-Based Learning*, is a curriculum and program development consultant. Her new book, *The Project Leap,* will be published in 2012.