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# Stepping into STEM

**Science is beautiful when it makes simple explanations of phenomena or connections between different observations. -Stephen Hawking**

Parents and students constructing a nest in Mrs. Garcia's class on Orr's Science Parent Day.

## Here's the M in STEM!

The year has been spent addressing the standards and checking for understanding in preparation for the state test. Once it is over, you have 4 - 6 weeks of the school year left, now what?! How will your students stay engaged in learning math for the remainder of the school year? This is a great time to reteach and reinforce the standards. Fear not, it doesn't have to be boring! The link below offers some great project based ideas to address potential weak spots while continuing to make math fun and engaging. Your grade level Google Classroom for math is another great place to look for resources. Go HERE for a list of resources.

### MATH ON TWITTER

Elementary Math Chat

@ElemMathChat

Strategies shared for elementary math.

### TECH ON TWITTER

Todd Nesloney

@TechNinjaTodd

TEDx Speaker, Co-Author of Kids Deserve It and Sparks in the Dark

### SCIENCE ON TWITTER

Hope King

@hopekingteach

Ron Clark Academy teacher. You can follow her on Instagram as: @elementaryshenanigans

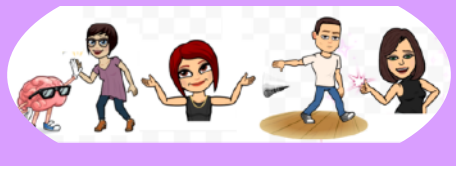
### Tech Corner

As our students spend more and more time online, digital


citizenship instruction becomes increasingly important. Digital citizenship instruction includes: how to protect private information, how to stay safe online, how to balance time spent online, how to stand up to cyberbullying, how students can manage their digital footprint and respect copyright and intellectual property. This sounds like a lot, right? Luckily, picture books are being published to help you teach these concepts and begin an authentic discussion with your students on digital citizenship. Go HERE for a list of books.

### Contributors

Maria Gutierrez
Denisse Frenes-Gomez
Roger Block
Erin Dunroe



# Crosscutting Concepts

## What are the crosscutting concepts? How do we implement them?

The three dimensions of NGSS refer to the science and engineering practices, the disciplinary core ideas (content), and the crosscutting concepts (CCCs). The crosscutting concepts are themes that can be found throughout the science disciplines. By explicitly teaching our students about the crosscutting concepts, we provide them with an organizational framework for connecting knowledge from various science disciplines into a coherent and scientifically based view of the world. First, choose one crosscutting concept to focus on during the unit and try to incorporate it into the driving question for the unit. Then, take some time to explain the concept to the students and reinforce it throughout the unit. You can do this through the questions you ask during discussions and classroom assignments. This resource, STEM Teaching Tools #41, offers prompts for all of the CCCs. Below are explanations of the seven crosscutting concepts.

**Patterns**

Patterns exist everywhere, from regularly occurring shapes and structures to repeating events and relationships. This crosscutting concept can be introduced to students at a very young age. Encourage students to identify patterns in the natural world and record them in their science notebook. Students should predict what will happen next based on the a recorded pattern. Patterns in the natural world include: phases of the moon, seasons of the year, or even dropping objects from different heights.

**Lakeview students preparing to test their parachute.**

**Cause and Effect**

Instruction on this CCC encourages students to see events in the world as having understandable causes, even when these causes are beyond human control. When students record and analyze patterns encourage them to consider what may be causing the patterns and design tests to gather additional evidence.

**Scale, Quantity, and Proportion**

In thinking scientifically about systems and processes, it is essential to recognize they vary in size (cells, whales, galaxies), in timespan (nanoseconds, hours, millennia), and in the amount of energy flowing through them (lightbulb, power grid, sun). The NGSS Framework suggests young children can begin to understand scale with objects, space, and time related to their world with concrete models. As students progress (first, second grade) introduce units related to length first then add units that express quantities of weight, temperature, etc.

**"Some important themes pervade science mathematics, and technology and appear over and over again, whether we are looking at an ancient civilization, the human body, or a comet." - American Association for the Advancement of Science**

**Systems and System Models**

The natural and designed world is complex, it is too large and complicated to investigate all at once. Scientists and students investigate smaller portions called systems, an organized group of related objects or components that form a whole. A good system model shows how the parts of a system interact while also identifying what flows in and out of a system. Starting at the earliest grades, students should be asked to express their thinking with drawings and written and oral descriptions. As students progress their models should move beyond simple drawings and begin to incorporate the invisible features of a system such as matter transfers (i.e. water cycle).

**Energy and Matter**

Laws of conservation provide limits on what can occur in a system, for example without inputs of energy (sunlight) and matter (carbon dioxide and water), a plant cannot grow. The NGSS Framework explains, "Young children are likely to have difficulty studying the concept of energy in depth." For this reason, the concept is not developed at all in K-2 and only very generally in grades 3 - 5. Instead elementary should focus on the conservation of matter and how it flows in and out of systems.

**Structure and Function**

A bird is made of many parts (structures) and each part does a job for the bird (function). It is important for the students to understand this idea of structure and function can be applied to everything (living and nonliving). Exploration of the relationship between structure and function can begin in the early grades through investigations of visible systems such as observing how different animals get food. As students move through the elementary grades they can begin examining the relationships of structure and mechanical function (wheels and axles, levels, etc.)

**Stability and Change**

Stability describes a condition is which some aspects of the system are unchanging, at least at the observation level. For example, a ladder leaning against a wall. However, a repeating pattern such as the phases of the moon can also be seen as stable. It is important to teach students about forces acting on objects that appear to be stable. Very young students can begin to explore stability (as they build) and change (as they grow).

## Engineering Zone

This month we have spring-themed engineering challenges. Remember, anytime students are working on an engineering activity, it is important for them to use the engineering design process. Click HERE for a video on the steps. Click on the links below for the engineering projects.

**TK/K/1st**: Design and build a Carrot Carriage. HERE
**2nd/3rd**: Design and build a nest that will hold as many eggs as possible. HERE
**4th/5th**: Design and build a colony on a new planet. This assignment has several possible parts and could become an extended project-based assignment that includes math, ELA and science for the end fo the year. CLICK HERE

**Lakeview students testing boats.**