21 Growth Mindset: Electricity

A Resource for Teachers

Overview

Because of children's natural curiosity, they begin to explore electricity by watching thunderstorms, flipping light switches on and off, and other exploratory and potentially dangerous ways. Electricity is everywhere and absolutely useful, but it also can be very dangerous and electrical accidents may occur.

"In the United States, 50,900 fires each year are attributed to electrical failure or malfunction, resulting in 490 deaths and 1,440 injuries. Arcing faults are a major cause of these fires. About 3,300 residential fires originate in extension cords each year, killing 50 people and injuring about 270 others," (Retrieved January 2016, http://www.esfi.org/resource/holiday-data-and-statistics-359).

We know that the prevention of fires and accidents requires knowledge and awareness. Children can be introduced to the power and purpose of electricity in age appropriate ways, and they will take that knowledge and understanding home to their families.

There are many websites and other resources to help educators develop engaging learning experiences and connect those experiences to specific curriculum outcomes. However, educators need the time to imagine exciting and open-ended ways to introduce key concepts to their students so experimentation and exploration can take place. We know a key to developing a growth mindset toward scientific thinking is to help children to think like a scientist and develop a positive, growth-oriented attitude toward learning scientific concepts. Carol Dweck (2016), a researcher from Stanford University explains,

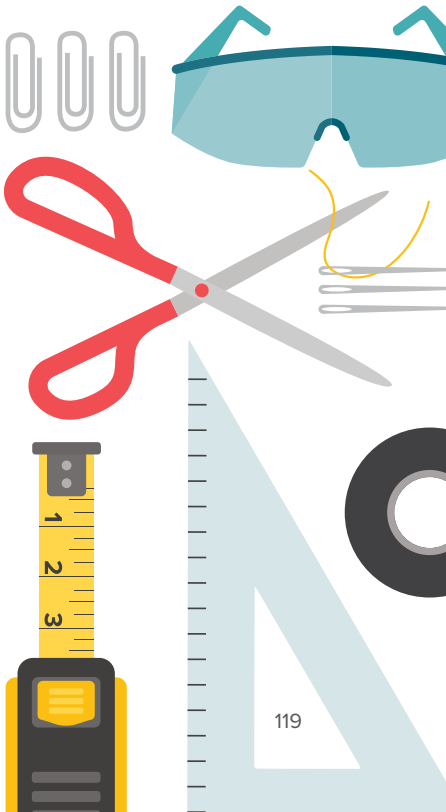
"In a growth mindset, people believe that their most basic abilities can be developed through dedication and hard work—brains and talent are just the starting point. This view creates a love of learning and a resilience that is essential for great accomplishment. Virtually all great people have had these qualities," (Retrieved January 2016, http://mindsetonline.com/whatisit/about/index.html).

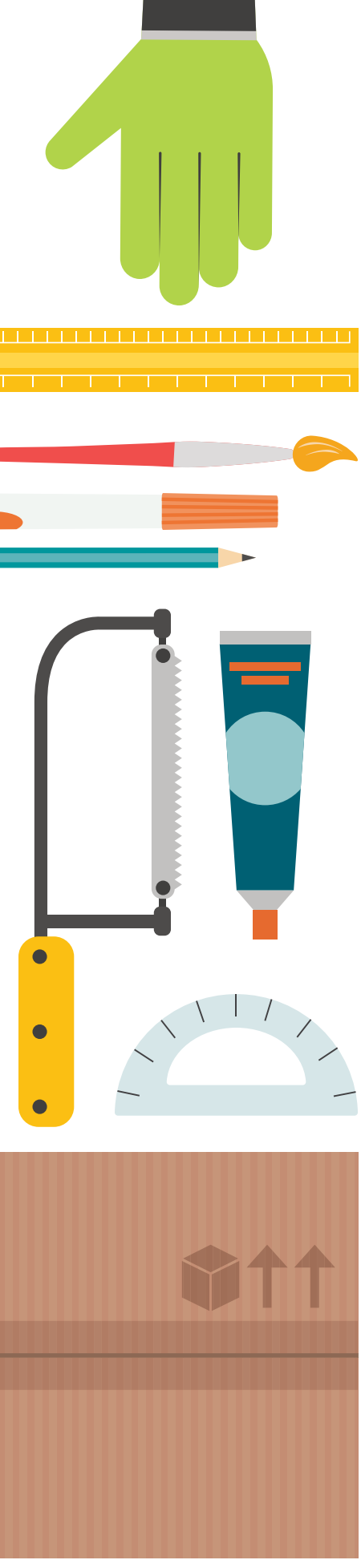
Scientific thinking refers to the process of observation, exploration and discovery by being curious, open-minded and creative (Retrieved January 2016, **http://undsci.berkeley.edu/article/think_science**).

SkillsCanada Alberta

Suggested Audience

- Curriculum leaders
- District directors of instruction/learning leaders
- Elementary classroom teachers





Design Rationale

A 2003 study (Retrieved January 2016, **https://www.researchgate.net/publication/248975096_Attitudes_towards_Science_A_Review_of_the_Literature_and_its_Implications_International_Journal_of_Science_Education_259_1049-1079**) suggests that students' attitudes toward science are impacted by the following factors:

- anxiety toward science
- attitudes of parents towards science
- attitudes of peers and friends towards science
- enjoyment of science
- fear of failure on course
- motivation towards science
- perception of the science teacher
- personal achievement in science
- personal value they place on science
- self-esteem at science
- the nature of the classroom environment

Helping students create positive attitudes toward science often falls solely on classroom educators, who themselves may not have a growth mindset about their own abilities toward tackling science concepts. Therefore, educators need opportunities to explore science in supportive, hands-on, experiential ways.

Problem Scenario

Your group has been selected to develop a sample learning activity that introduces students to a core concept about electricity in a hands-on, experiential way. Your group must design the learning activity, write it up in a way that other educators could use it in their classes, connect it to your curriculum, and complete the activity yourselves, providing a working model of the learning.

Your design challenge is situated in the topic of electricity because it is important that children understand its potential and power in safe yet challenging and engaging ways. You need to design an activity that satisfies their curiosity about electricity and fosters their love of play. An interesting starting place to explore learning activities might be the following links (Retrieved January 2016): **http://www.pbs.org/parents/adventures-in-learning/2014/02/electric-play-dough/** or **https://cset.stanford.edu/sites/default/files/files/documents/publications/Osborne-Attitudes%20Toward%20Science.pdf**).

Success Determinants

Success will be determined by:

- ❒ Alignment to design motto: “Make it smaller, stronger, do more, be easier to use, be cheaper, be clean, be greener.”
- ❒ Complexity and opened-ness of the learning activity—the ability of students to explore and experiment and show what they know and need to learn rather than follow a script or a recipe to complete the task
- ❒ Degree to which it is adaptable to all students at a specific learning level/stage or age
- ❒ Degree to which your activity adheres to your design sketch
- ❒ Practicality of the learning activity for the average classroom
- ❒ Uniqueness and usability of your learning activity and the degree to which it solves a curricular outcome

Parameters

- ❒ You must be prepared to explain and share your learning activity and completed project.
- ❒ You must consider how to make your learning activity safe, intriguing, informative and fun.
- ❒ You must create a lesson write up that other educators could follow and adapt.
- ❒ You must use some of all the items in your participant kit in some way.
- ❒ Your learning activity must be helpful in teaching children about electricity.