EDUCATING AND INSPIRING EXCELLENCE

SJUSD

SAN JACINTO UNIFIED SCHOOL DISTRICT

Science Monthly

District NGSS and Science News

PHENOMENA PHE-BRUARY!

FEBRUARY 2020

PHENOMENA

Website of the Month: Animalearn

YouTube Channel Of the Month: Bozeman Science

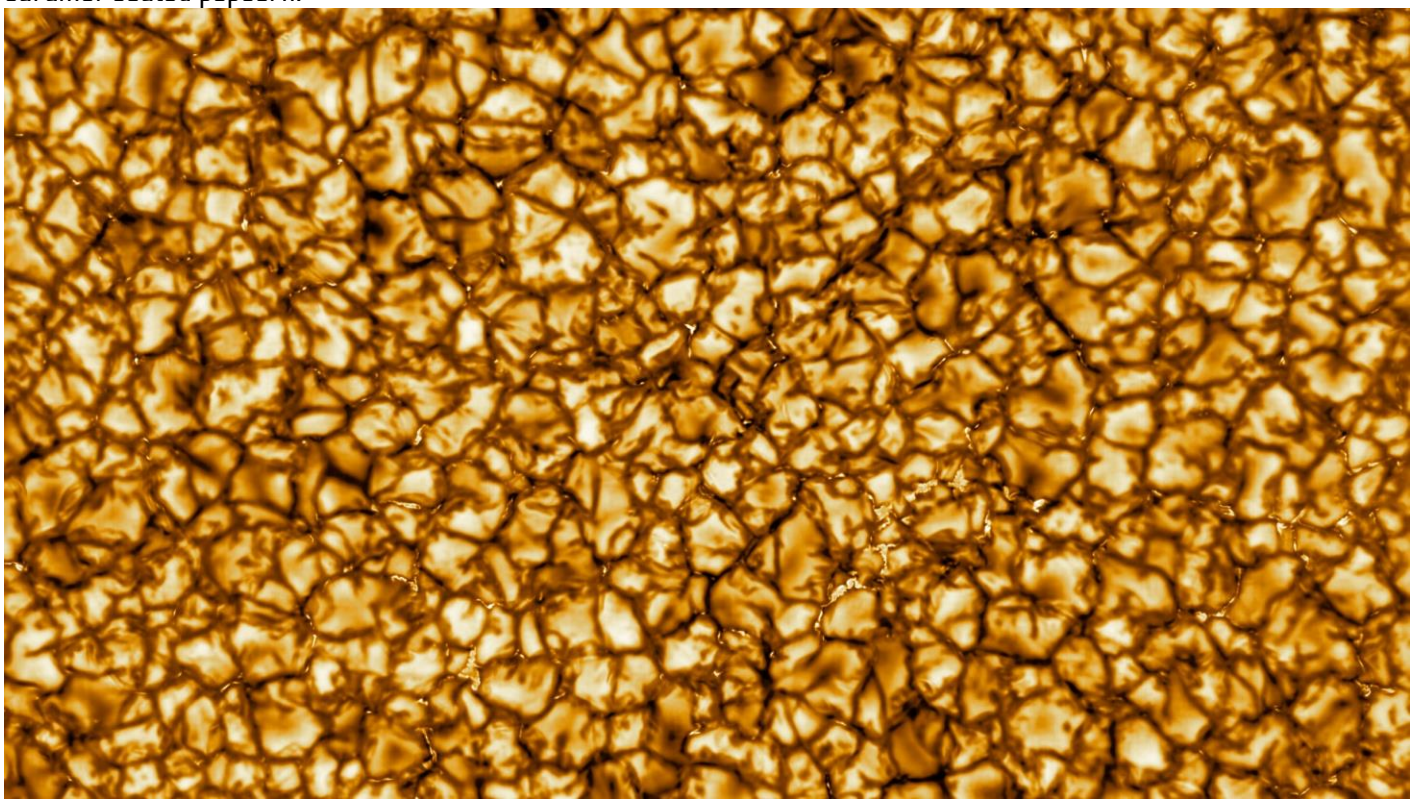
NGSS Explained: The SEPs Part II

Phenomena Phe-bruary!

Science is happening all around us…

Phenomena has become a huge buzz word in the science education world for a good reason. Looking at a single phenomenon can spark questions and set the stage for the rest of an entire unit. Think of your favorite movie trailer. It catches your attention, makes you wonder what's going to happen next, and most of all you have an internal drive to learn more. Sometimes it seems like we are pulling teeth to keep students interested in a lesson but it's amazing how much internal motivation can be drummed up when students are shown a video or photo of something first.

Let's talk about a phenomenal phenomenon that happened just a few days ago. Scientists released a very special photograph and many people on social media were confused why scientists were so excited for a picture of some caramel-coated popcorn.



What do you notice? What do you wonder? What will you google first?

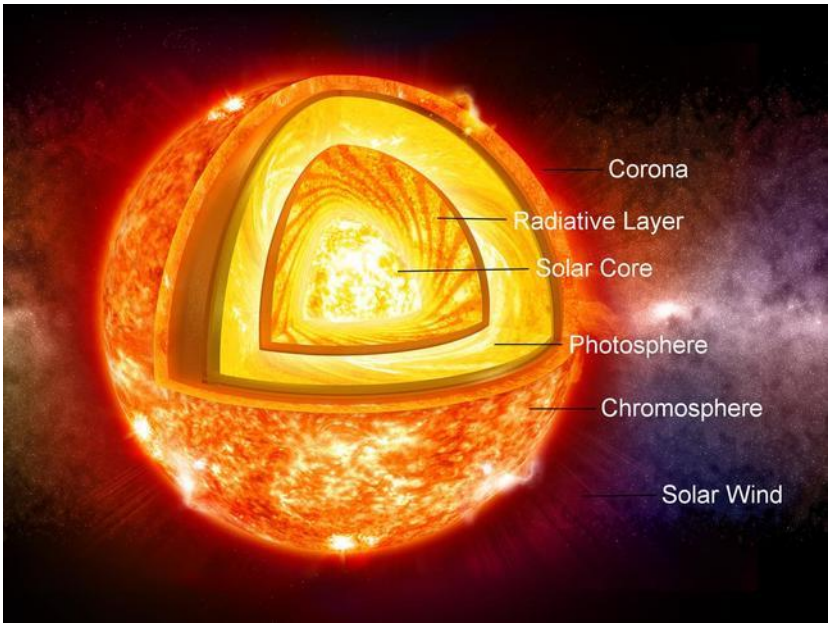
On January 29, 2020 astronomers released this photo of the surface of the sun taken by the Daniel K. Inouye Solar Telescope in Maui. The highest resolution ever taken, there is so much to be learned from just looking at the patterns being created by the fluid motion of plasma. If you want to see the surface in motion to observe all of those eruptions churning due to the convection heating of the plasma, or just to be amazed because it looks super cool, visit the YouTube page for the National Solar Observatory.

Try it with your students using a 5E Lesson:

Engage: Phenomena first! Always start with the movie trailer that is going to have the kids wanting to know more. Watch the video of the surface of the sun and ask your students what they notice, then ask they wonder about. Write down their questions on a board or chart paper so that they stay up for referring back to later.

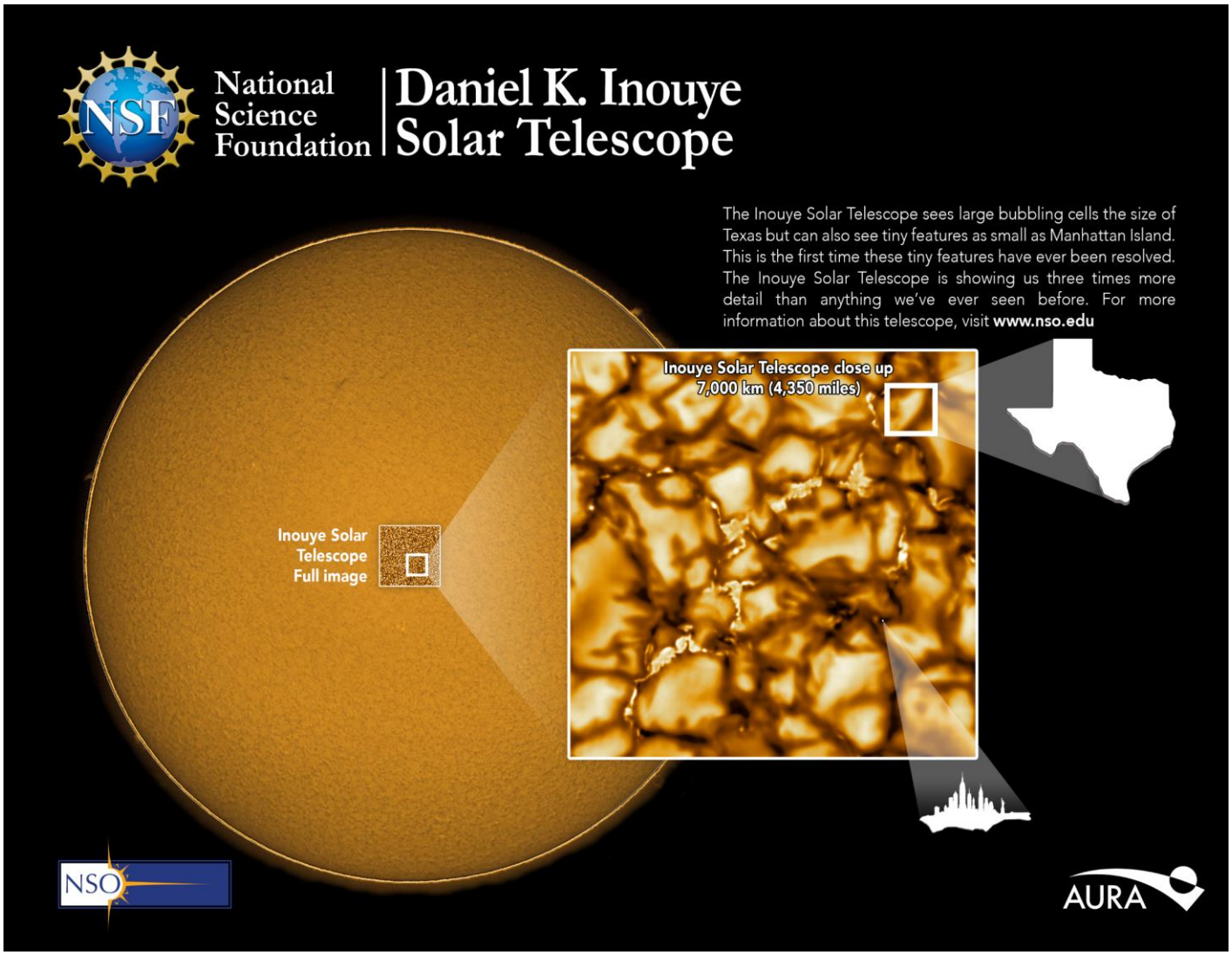
	Traditional (I do)	Now with NGSS (You do)
Engage	I tell them... I show them...	Student reflects Student questions
Explore	I give them... I demonstrate... They look at a model...	Student unpacks problem Student develops model Student gathers data
Explain	Turn & Talk Carousel "Discussion" What did... What was...	How have you answered the question? How have you solved the problem? How does evidence support this claim?
Elaborate	Read about Watch Introduce new idea	Concept-self connections Concept-concept connections Concept-world connections Anchor → Investigative Phenomena
Evaluate	Give vocab. assesssment Keep journals to grade	Reflect on investigative process Reflection hypothesis New reflection on anchor phenomena

Explore: Review the questions your students asked, then send them to the National Solar Observaotry website at https://www.nso.edu/ and see what questions they can answer on their own. The great part about letting the students explore a preapproved website is like taking them to a specific section of the library. Whatever they find is authentic scientific data. Save some time at the end for students to take turns being the teacher. Keep a parking lot for neat facts and ask students to share out what they found and if they were able to answer any of the class's questions. Essentially, the students wrote their own worksheet by posting and answering the questions. How's that for reducing your copy limit?!



Explain: Depending on the grade you teach, the explain portion can be as intricate or simple as you see fit for your students. For elementary teachers, you may consider talking about how hot the sun is and looking at videos of other very hot explosions. Middle school students learn about the scale of objects in space and there are plenty of examples of the size of the sun but also the same convection processes that churn our oceans also churn the surface of the sun. For high school, the sky's the limit, literally. You can study the solar

observatory itself to look at the engineering that goes into taking this quality of photographs and what chemicals are interacting to cause these explosions. Although it is our closest star, there is still plenty to learn about the sun as our technology advances. Maybe one of your students will be the next great solar astronomer!



Elaborate: This is the time where students are thinking about other connections to the main idea. Perhaps students could research the difference between our sun and other stars. Maybe groups of students could build their own pinhole cameras to safely study the sun here in San Jacinto. Here's a crazy idea, what if we asked the students what they feel inspired to do next? You might be surprised what they can come up with when allowed to be a little creative.

Evaluate: Each step of the 5E process is intended to be completed by the student. They are being engaged, they explore for themselves, they should be able to explain the concepts on their own, they elaborate on what they already know, and lastly they should be able to evaluate how much they understand and determine if they need to do any more

research. Arguably the trickiest part of the lesson, getting students to become self-aware of their own knowledge deficits is not an easy task but it is a skill they should always be working on. An activity where students may feel the need to continue their own research is by holding a debate. Split your class into teams that have to research and debate something to do with the sun. A little competitiveness always seemed to drive my students to want to be very prepared for their arguments so that they looked their best in front of their peers. Here are some starting questions to spark a class debate:

- Should solar observatories receive more funding? Why?
- Should astronauts fly close to the sun to observe it in person? Why?
- Is there anything applicable we can learn by studying a star so far away from our planet?

Whatever phenomenon comes across your desk or computer screen, remember to preserve the wonder. Keep the spoilers to yourself until the students have had a chance to nurture their own curiosities! So, after all that, **what are you feeling inspired to try next?**

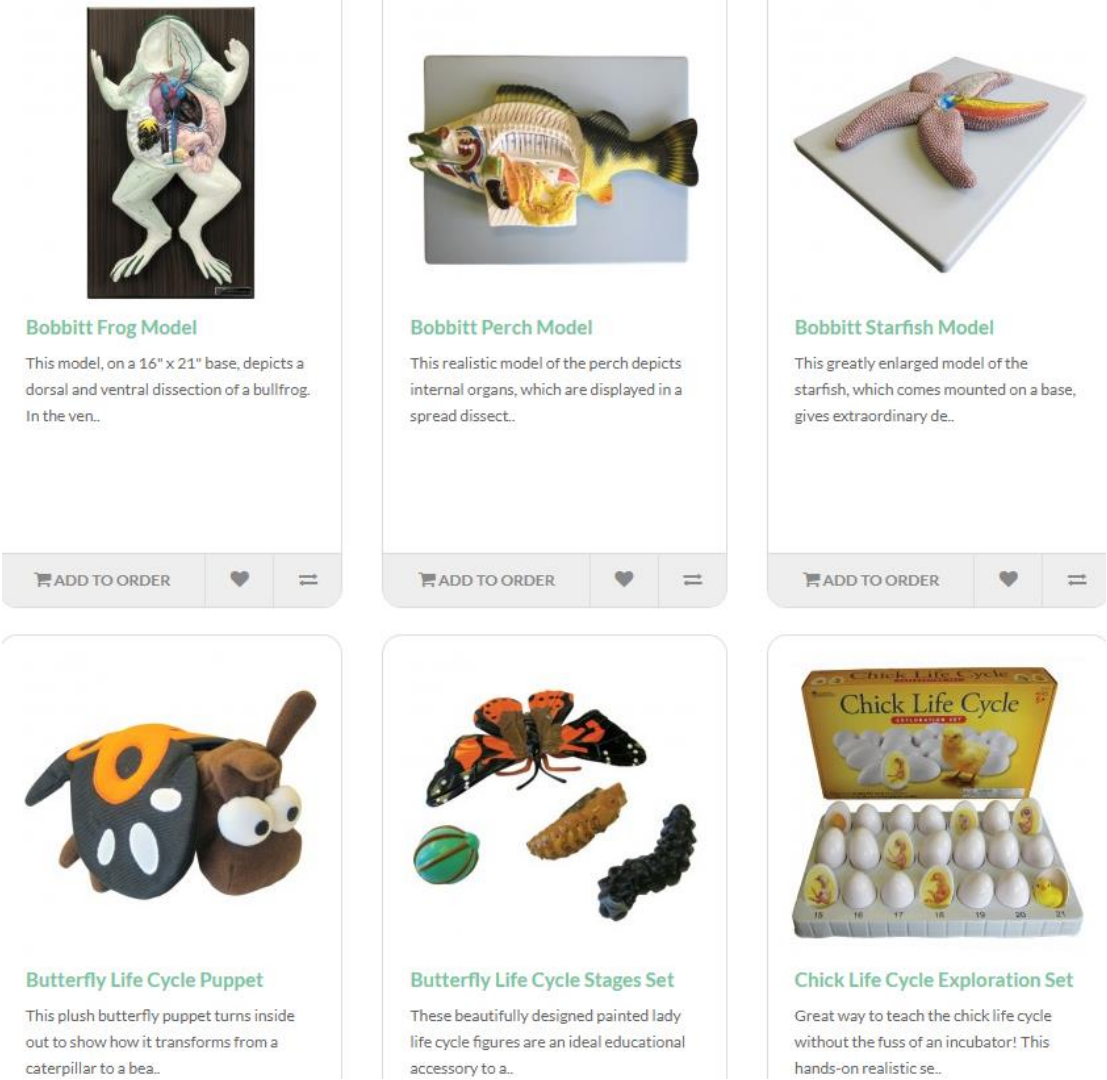
Website of the Month: Animalearn

http://www.animalearn.org & http://thesciencebank.org

A great way to engage students and get them asking questions is with class dissections. This could be a completely new experience for many of our urban students who do not have families who hunt and fish, looking at the inside of an animal for the first time outside of the grocery store. We choose to dissect animals to learn more about our own bodies and to see how these living machines function. Often times however there are difficulties with traditional dissection methods such as lab safety and cleanup of "mysterious" liquids. For the elementary grades, dissections almost never happen because young students can become very sensitive when asked to take apart something they may have at home as a pet. Luckily, there are still ways to provide hands-on dissections of animal models that are becoming more realistic as technology advances.

Animalearn strives to put the life back into life science. Established in 1990, Animalearn is the educational division of the American Anti-Vivisection Society (AAVS) and their mission is to end the harmful use of animals in education. They strive to build awareness about animal use in the classroom and provide resources,

both digital and hands-on, so that educators can reduce their reliance on authentic animal specimens. All that being said, there is still tremendous value in being able to take apart a specimen and see how everything connects. Animalearn is here to help by checking out realistic animal models for your demonstrations with their Science Bank!



The Science Bank is a library of models that can be checked out and then shipped back. While borrowing materials from the Science Bank is free, they do not cover the cost of shipping the package back. All costs considered however, the cost of shipping is significantly cheaper than purchasing the models and maybe even cheaper than the costs of traditional one-time-use specimens for class dissections.

Whatever your preferences are for classroom dissections, it should be noted that in the state of California teachers must inform students ahead of time that a traditional dissection is going to take place. If a student objects to participating in a dissection or objects to being present during the demonstrated dissection, you must provide them with an alternative assignment and place to work in.

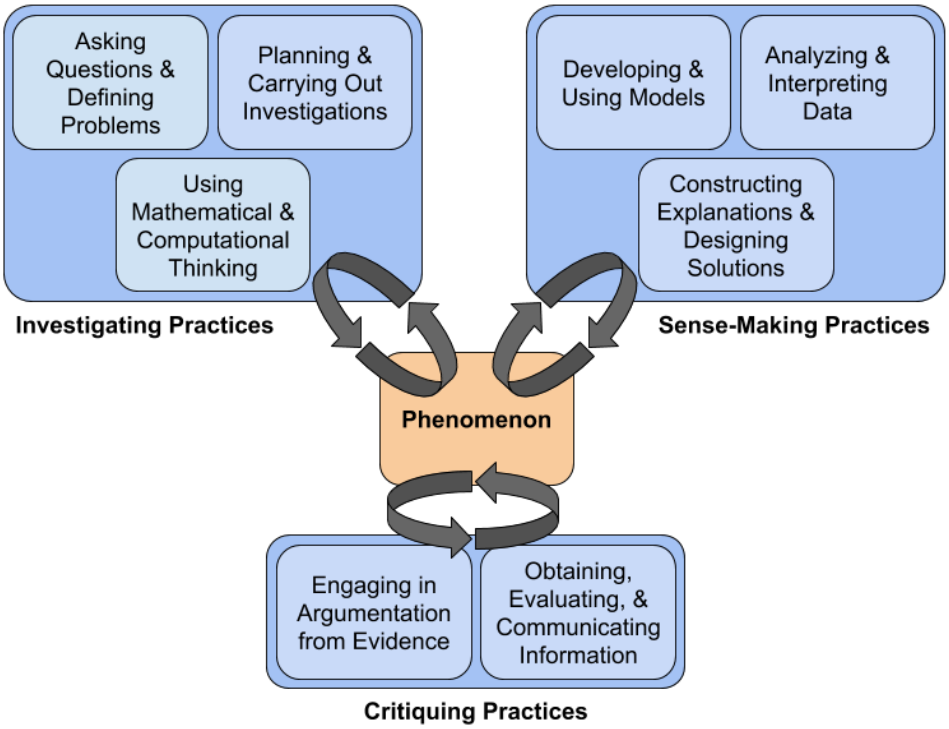
YouTube Channel of the Month: Bozeman Science

https://www.youtube.com/user/bozemanbiology

Paul Andersen has become a powerhouse in the science education world for his instructional videos used in many high school science courses. More recently though, Mr. Andersen has been producing videos for teachers too on the Next Generation Science Standards and teaching the inquiry process to students. All of us come from different knowledge backgrounds when it comes to teaching science but NGSS is still all new for everyone. The new teaching shifts call for us to rethink our teaching practices and really develop authentic, scientific learning experiences for our students. Whether you are looking to take a crash course or just brush up on your NGSS knowledge, the Bozeman Science YouTube Channel is a very reliable place to start.

NGSS Explained: The Science and Engineering Practices (SEPs)

Part II of our series continues through the SEPs, spotlighting the skills our students are building in our classes as they absorb all the knowledge we can cram into their heads.



Planning and Carrying Out Investigations

When we look back on our experiences as science class students, it is very likely that you remember receiving a set of instructions and following through with a recipe for the perfect science lab. It is very likely that you have also taught a lab this way and these lessons provide great opportunities for our students to learn the common procedures of a laboratory experiment. It is less common however, outside of science fair season, to find teachers giving students the opportunities to plan their own experiments. It can be scary as an educator to let go of some of the planning, crossing our fingers that the students come to the proper conclusions as written in our objectives on the board, but it is the final stage of the Gradual Release of Responsibility to allow students to design and carry out an experiment. First let's be clear, this does not mean that we are giving our students toxic chemicals without any instructions. We are however providing safe spaces and materials with well-established classroom management routines to support student inquiry. This is a great time to support academic struggle by not commenting on your students' plans right away, see if they can identify and solve their own problems first.

Golden Chia (*Chia columbariae*)

"Chia sprouts during the spring and it's seeds are collected during the summer months when the plant has dried. Seeds are extracted from the plant using a seed beater made from willow and sumac. A seed beater is similar to a tennis racket. You hit the dried plants and knock the seeds into a basket for easy collection. Collecting seeds in this manner not only stimulates growth of the plant but also allows for dispersion."

-Jessica Valdez, Cultural Resource Specialist

Soboba Band of Luiseño Indians

Take for example the investigation set up in this lesson: You teach students about the cultural practices of the indigenous Soboba people and students learn how they collect and help spread chia seeds. Then you look at how chia seeds gel up and how you can spread the gel on a pot (Chia Pets) and the seeds grow like that. Now you ask the students "How can we decide as a class which method will grow the healthiest/tallest/fastest/etc. chia plants?" Let your students brainstorm and come up with some relatively safe investigations so that the whole class can investigate and gather evidence together.

Follow this bitly link to see the full slide deck of "Indigenous Chia": **http://bit.ly/chiascience**

Claim - Evidence - Reasoning

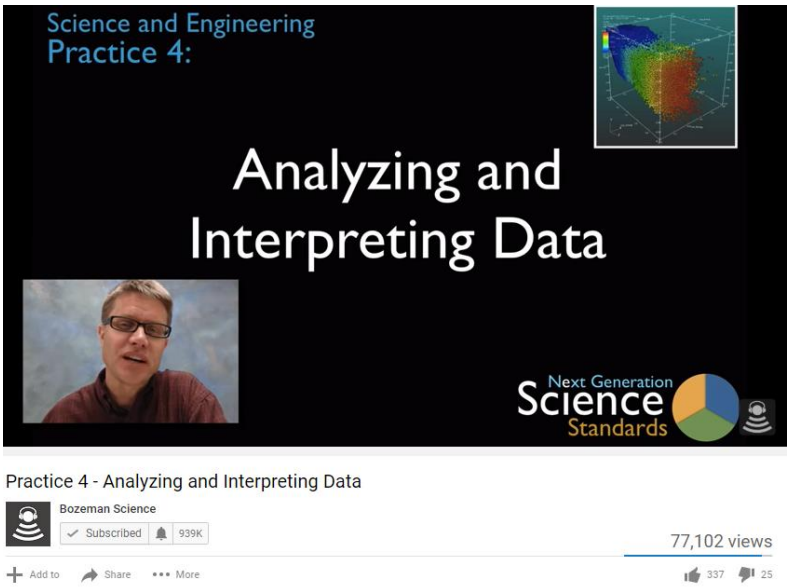
Claim: The best way to plant chia is by adding water to the chia seeds (before/after) I plant them.

Evidence: When water is added to chia seeds_____.

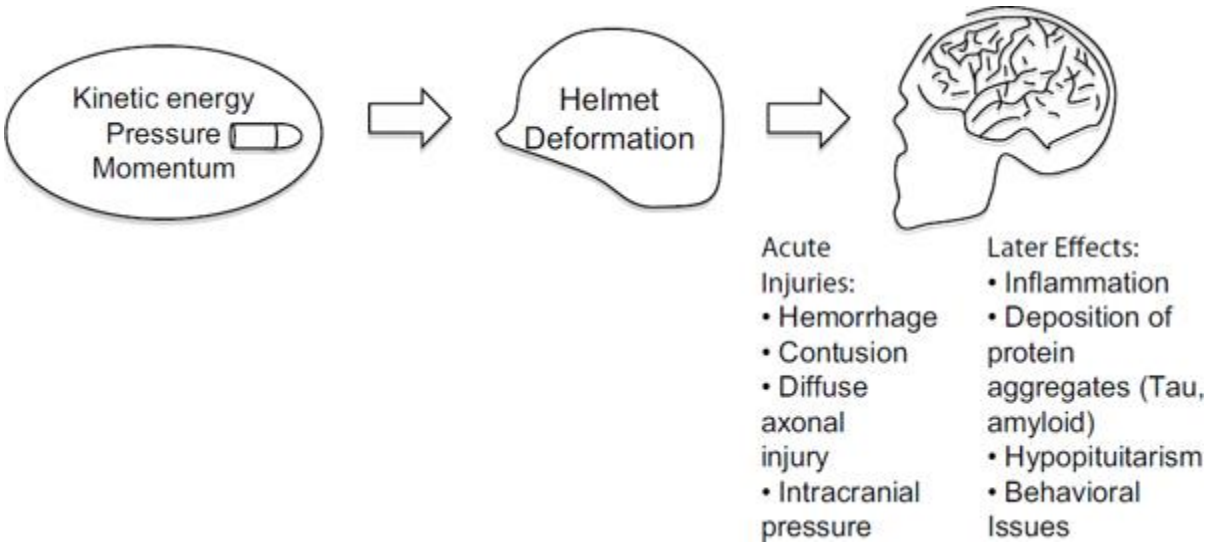
Reasoning: Since chia seeds_____, gardeners should _____.

Analyzing and Interpreting Data

A skill that more commonly overlaps with Mathematics and Social Studies, students need multiple opportunities to try to make sense of evidence. For younger students, they are spending time learning how to read graphs and make sense of patterns they identify. Moving on to secondary science classes, students are working hard to extrapolate data from various sources.

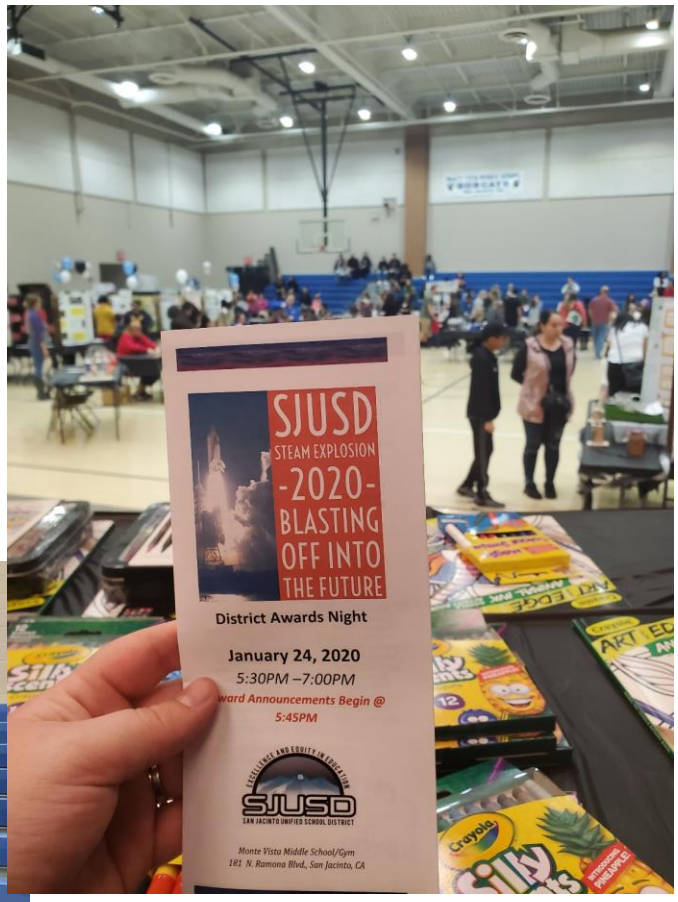


There is a story about how some politicians in WWI argued against spending more on military helmets because after they were distributed they saw a rise in serious head injuries. This serves as a cautionary tale of how you interpret your data because these politicians neglected to compare the decline in deaths due to head injuries. Even though they still were injured by the blasts, soldiers that otherwise would have simply died on the field were able to go home. We must provide our students with opportunities to not just read and relay the quantitative numbers that appear in charts, but they should also be given opportunities to discuss and make sense of what the numbers mean.



STEAM Explosion 2020

Huge shout out to all of our participants from SJUSD and our local community organizations who made this year's STEAM Explosion a night to remember!




VENUS
explore at solarsystem.nasa.gov/venus
MARS
explore at solarsystem.nasa.gov/mars
SATURN
explore at solarsystem.nasa.gov/saturn
NEPTUNE
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URANUS
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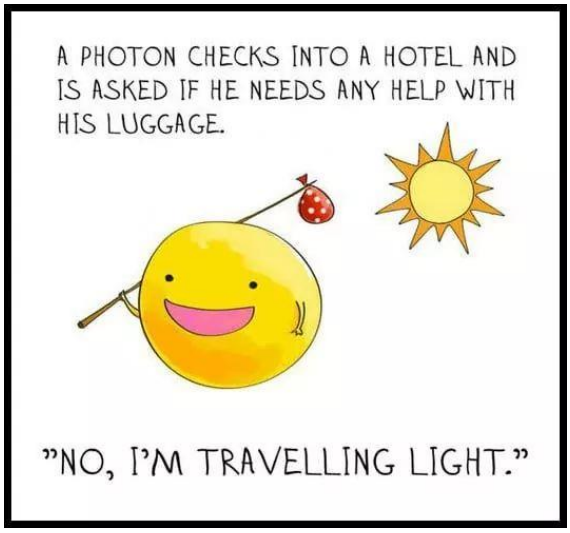

Contact and Support

Jackie Gardner: SJUSD NGSS TOSA
jgardner@sanjacinto.k12.ca.us Phone: (951) 929 - 7700 ext. 4252
All Science Monthly Resources: http://bit.ly/sciencemonthly
Website: https://thefishnerd.weebly.com