October 24, 2017

Guest Speaker

Let's Figure This Out Together: Sense-Making in the NGSS Classroom
Cindy Passmore, UC Davis School of Education
What are we trying to figure out? Come hear about some approaches to teaching science that foreground wonder and curiosity about the world around us. The 8 practices defined in the Framework for K12 Science Education and NGSS provide a roadmap for rich sense making and deep learning. (Presented at CSTA 2017)

Elementary Strands

K-2nd Grade Science
Playground Properties
Instructor: *Michelle Rossi, Sacramento City Unified School District*
An instructional segment from the CA Dept. of Education's second grade framework. Students plan and carry out investigations based on properties of rocks which leads to an engineering challenge around sand castles.
NGSS: 2-PS1-1, 2-PS1-2, 2-PS1-3

3rd-5th Grade Science
Rotting Fruit and Disappearing Dead Stuff: Developing Models, Observing Flows, and Defining Systems
Instructor: *Barbara Woods,* Galt Elementary District
Observe the exciting world of rotting fruit while exploring questions such as "Where did it go?" and "How did it get there?" Develop models and define systems exploring organisms and the flow of matter, making sense of every day common occurrences where matter changes and dead matter disappears. Or does it?
NGSS: 5-LS2-1, LS2.A, LS2.B

Middle & High School Strands

Earth Science
You are STARDUST!
Instructor: *Ingrid Salim, SASP Teacher Leader*
In this workshop you will engage in learning tasks to help you and your students develop a model for why this claim can be made.
NGSS: HS-ESS1-3

Life Science
Mutations
Instructor: *Megan White and Sarah Caves, Stonegate Elementary*
In this workshop we will explore how genetic information can change over time by building a model of DNA function and mutation.
NGSS: MS-LS3-1, MS-LS4-5

Physical Science

Ride the Wave

Instructor: *Mike Hotell, West Campus High*

Increase student engagement with the development of a mechanical wave model. Emphasis is on student sense-making of phenomena. The mechanical wave model can be applied to seismic phenomena and extended to electromagnetic waves.

NGSS: MS-PS4-1, MS-PS4-2, HS-PS4-1, HS-ESS2-3

November 14, 2017

SIRC
science in the river city

Guest Speaker

Exploring Mars with Curiosity
Dawn Sumner, UC Davis Earth and Planetary Sciences
The Curiosity rover has been exploring Mars for five years, providing exciting data to the science team. In this presentation, I/Dawn will share a taste of how the team operates Curiosity, some of the beautiful images we use to interpret ancient environments on Mars, and what we've learned about how those environments could have supported microscopic life. We have not found evidence of life, but there were once rivers and lakes that had all the resources necessary to support life as we know it on Earth.

Elementary Strands

K-2nd Grade Science
Our Choices Matter: Affecting the Environment
Instructor: *Nancy Ludu, Isabelle Jackson Elementary*
Students are never too young to start thinking about how our choices affect the environments in which we live. These activities will help students construct arguments supported with evidence about how plants, animals, and humans can change their surroundings to meet their needs.
NGSS: K-ESS2-2

3rd-5th Grade Science
Charge It Up
Instructor: *Rita Mukherjee Hoffstadt and Emily Anderson, Powerhouse Science Center*
Explore a new Powerhouse Science Center program designed to introduce elementary students to energy and electricity. Have fun working with devices that convert energy from one form to another, while understanding the definition of energy and Law of Conservation of Energy. Then work with electrical circuits to complete a series of challenges.
NGSS: PS2, PS3, ETS1

Middle & High School Strands

Earth Science
Explaining the Wonders of Water
Instructor: *Kelli Quan, Elk Grove Unified School District*
Water covers over 70% of the Earth's surface and plays a key role in the functioning of living things. In this workshop, participants will make sense of the unique properties of water and how the cycling of this chemical has helped shape the planet.
NGSS: MS-ESS2-4, MS-ESS2-6, HS-ESS2-5

Life Science

Now You Sea Ice, Now You Don't: Biodiversity in Antarctica

Instructor: *Aaron Pecho and Kerin Butterfield, Sacramento City Unified School District*

This NSTA lesson explores the impact of climate change on Biodiversity in Antarctica. Students will graphically represent data and utilize multiple lines of evidence to make sense of climate change impacts on the Adelie and Chinstrap penguin populations. This lesson utilizes the expert jigsaw approach to student discussions which scaffolds and supports all students in engaging in rigorous, evidence based discussion. At the end of the lesson, students create a group model of climate change impact in Antarctica and an assessment is included to challenge students to use and evaluate the model they created.

NGSS: MS-LS2-1, MS-LS2-4, HS-LS2-6

Physical Science

Understanding Nuclear Science and its Applications

Instructor: *Laura Shafer, Sacramento Area Science Project (SASP) and Wesley Drew Frey, McClellan Nuclear Research Center*

In this workshop teachers will experience multiple ways to incorporate nuclear chemistry into High School Life and Physical Science Lessons. We will explore the resources available at the UC Davis McClellan Nuclear Research Center. We will examine the conservation of energy and energy transfer by comparing nuclear and chemical reactions.

NGSS: HS-PS1-8, HS-PS3-4

December 12, 2017

Guest Speaker

Integration of Engineering Practices and Activities into Science Curriculum
Ben Fell, Sacramento State, Department of Engineering
Dr. Fell will present an overall methodology to help teachers understand how engineering activities can be included as part of science instruction. Since 2016, he has been engaged in a project titled "Integrating Science and Engineering Education" (iSEE) where the approach has been introduced to Sacramento-area teachers leading to novel lessons across a wide range of science disciplines. Through NGSS and academic literature, along with his own thoughts on the applicability of engineering in K-12, the presentation aims to provide a framework for teachers to apply to their specific science and site needs.

Elementary Strands

K-2nd Grade Science
Play Ball!
Instructor: *Steven Howe, Mary Tsukamoto Elementary*
Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. Children at play discover how the laws of physics effect the objects they play with.
NGSS: K-PS2

3rd-5th Grade Science
Water Ways, Plastics, and Pollutants
Instructor: *Rebecca Cihak, CTA Instructional Leadership Corp*
Participants will learn about the effects of plastics and pollutants that have impacted the water cycle and the watershed. In addition, participants will design and engineering a water filtration system.
NGSS: 3-5-ETS1-1

Middle & High School Strands

Earth Science
Earth's Formation and Early History
Instructor: *Rich Hedman, Sacramento Area Science Project (SASP)*
How do we know the earth's age and early history? Examine phenomena, identify data patterns, generate questions, and develop initial models. Apply the models to construct explanations to answer our driving question, and seek consensus on the explanation which is best supported by evidence and reasoning.
NGSS: HS-ESS1-6

Life Science

The Three Dimensions of the Bad Seed

Instructor: *Anna Newman, Roseville Joint Union High School District*

Participants will engage in a hands-on activity around the amazing phenomenon of the Filaree seed, or Stork's Bill. Through exploring the unique behavior this seed exhibits, questions will be created using the Question Formulation Technique (QFT) developed by the Right Question Institute. The questions produced by the QFT serve as the beginning of a whole group talk format. Whole group talks are modeled as a means of formatively assessing students' prior knowledge. Participants will leave with a written questioning protocol based on work from The Right Question Institute and a strategy for using discourse as a formative assessment

NGSS: MS-LS1-1, HS-LS1-1

Physical Science

Forces versus Fields: Helping Students Understand the Difference

Instructor: *Scott Richardson, Davis Senior High*

Force fields are popular in science fiction, but are fields real? If so, what are they? This workshop will look at some ways to help your students understand one of the most important ideas in modern physics--the abstract and often confusing idea of fields.

NGSS: HS-PS2-4, HS-PS3-5

January 30, 2018

SIRC
science in the river city

Guest Speaker

Using Underwater Robotics to Understand Lakes and Oceans in a Changing Environment
Alex Forrest, UC Davis, Department of Civil and Environmental Engineering
In future climate scenarios, impacts will be felt on our lakes and oceans that will, among many other results, threaten water supply, degrade ecosystem function and drive melting in polar regions. From draining epishelf lakes in the Canadian High Arctic to ice shelf collapse in East Antarctica, Alex Forrest will present on his team's usage of autonomous systems to address environmental challenges. The use of underwater robotics is critical to allowing the scientific and engineering communities that would be cost prohibitive or logistically impossible to access by other means. Autonomous and remote sensing technology development also allows new information to be collected that enables better predictions of how our environment will react as the climate continues to change.

Elementary Strands

K-2nd Grade Science
Investigating Light
Instructor: *Julie Harr, Churchill Middle School*
What are the effects of placing objects made of different materials in the path of a beam of light? Plan and conduct investigations to find out!
NGSS: 1-PS4-3, 1-PS4-2

3rd-5th Grade Science
Engineering Designs for Energy Transfer: Electricity, Natural Resources, and Environmental Impact
Instructor: *Jenna Porter, Sacramento State*
Participants will engage in engineering design challenges to convert energy from one form to another. They'll also explore how to design devices that convert natural resources into usable energy, and the environmental impacts for doing so.
NGSS: 4-ESS3-1, 4-PS3-2, 4-PS3-4

Middle & High School Strands

Earth Science
An Integrated Lesson: Living Organisms Effected by Celestial Patterns
Instructor: *Lisa Hegdahl, McCaffrey Middle School*
CA NGSS Early Implementer MS Integrated Lesson Sequence guides student exploration of how celestial patterns can affect organism populations as they respond to environmental changes overtime."
NGSS: ESS1.B, LS4.C

Life Science

Energy for Biologists: Productively Aligning Ideas with Physical Science Classrooms

Instructor: *Chris Griesemer, UC Davis*

How do you approach energy in your life science classes? Do both you and your students struggle with the concept? How much do you teach, and is it in accord with ideas they'll learn in physical science / chemistry / physics? We'll explore some productive ways to address energy in the context of NGSS standards that require students to explain phenomena around matter and energy in biological organisms. Importantly, we'll consider the ways in which energy is dealt with in physical science (MS) and in chemistry and physics (HS) in order to generate more robust model ideas in the life science classroom.

NGSS: MS-LS1-6-7, MS-LS2-3, HS-LS1-5, HS-LS1-7, HS-LS2-3-4

Physical Science

Did NGSS Throw Out Kinematics? Do we Skip Equations of Motion?

Instructor: *Scott Richardson, Senior Davis High*

Distance… speed… acceleration… NGSS seems to say nothing about the traditional equations of motion (kinematics) found in a standard physics or physical science class. What are teachers supposed to do? This workshop will explore some options for addressing this issue by focusing on one of the central goals of NGSS: Student making sense of motion.

NGSS: PS2

February 20, 2018

Guest Speaker

Classroom Shifts in Instruction with NGSS
Scott Richardson, SASP Teacher Leader
Have you ever thought to yourself, "I did a good job teaching today's lesson," only to find out a week or month later that the students seemed to have forgotten it all? What is going on in the mind of students? In this presentation we will examine student thinking, and we will show how a few significant shifts in how we teach can have a powerful effect on student learning.

Elementary Strands

K-2nd Grade Science
Phenomenal Invertebrates! Creating a Classroom Living Laboratory
Instructor: *Lorie Hammond, Peregrine School and Deb Bruns, Yolo County Office of Education*
We will illustrate how a variety of living classroom "pets" including worms, mealworms, snails, and crickets can be used in behavioral studies with invertebrates. Students can devise questions which enable the inquiry about a variety of cross-cutting concepts such as structure and function and stability and change. Results from real classroom inquiries with K-2 students will be shared.
NGSS: K-LS1-1, K-ESS2, 1-LS1-1

3rd-5th Grade Science
It's All Fun and Games (until the one with the disadvantaged variation dies)
Instructor: *Megan White and Sarah Caves, Stonegate Elementary*
Learn about variation, inheritance, and selection through games and activities
NGSS: 3-LS3-1, 3-LS3-2, 3-LS4-2, 3-LS4-3, 3-LS4-4

Middle & High School Strands

Earth Science
An Integrated Lesson: How Energy and Forces Have Shaped Earth's Surfaces
Instructor: *Deanna Mino, McCaffrey Middle School*
In this integrated middle school lesson sequence we will explore California's location along major faults, mountains, and tectonic plate boundaries results in varying terrain. Students will study how forces and energy have changed California's terrain over time.
NGSS: ESS2.A, ESS2.B, PS3.C

Life Science

Why did the murres die? Using Rich Phenomena to Explore Models Across Disciplines

Instructor: *Chris Griesemer, UC Davis*

We'll explore a single phenomenon, the death and beaching of thousands of common murres along the Alaskan coast in 2016. Though upsetting, this one event can be used in the classroom to explore models from the biological, physical and earth science standards. As scientists are continuing to develop an explanation, this current event also provides an opportunity to deepen students' understanding of the work of science. Sometimes answers only come about by exploring and integrating ideas across scientific disciplines.

NGSS: MS-LS1-6, MS-LS2-1, MS-LS2-3-4, HS-LS1-5, HS-LS2-3-5

Physical Science

Matter and Forces at the Small Scale

Instructor: *Arthur Beauchamp, SASP Consultant*

How do your students think matter and forces interact at the small scale? Explore a simple system that uncovers student thinking and deepens science understanding in chemistry and physical sciences.

NGSS aligned

March 20, 2018

SIRC
science in the river city

Guest Speaker

What Can Fruit Flies Tell Us About Autism?
Kimberly Mulligan, Sacramento State, Department of Biological Sciences
To identify environmental chemicals that confer risk of autism spectrum disorder (ASD), Dr. Kimberly Mulligan has established methods for screening chemicals using fruit flies. ASD refers to a group of behaviorally defined neurodevelopmental disorders. While ASD is highly heritable, there is also evidence that epigenetic factors, like environmental chemicals, can affect brain development during gestation to increase risk of ASD. There are over 80,000 chemicals in use today that have undergone little to no toxicological testing. Dr. Mulligan's research aims to increase the efficiency of chemical testing to help inform preventative measures for ASD.

Elementary Strands

K-2nd Grade Science
Exploring Forces and Motion with Roller Coaster Ramps
Instructor: *Paula Baucom and Anna Grace, San Juan Unified*
Using rollercoasters as a phenomenon, participants will explore several different ramp configurations to investigate how pushes and pulls effect the motion of an object.
NGSS: K-PS2-1, K-PS2-2

3rd-5th Grade Science
Me and My Shadow
Instructor: *Scott Richardson, Davis Senior High*
What is a shadow made of? Do shadows have color? Can I have more than one shadow? We can learn a lot from shadows, including some wonderful things about light and about our eyes. This workshop will introduce some hands-on activities and diagrams that will help your students begin to understand what it means to see the world.
NGSS: 4-PS4-2

Middle & High School Strands

Earth Science
Using Ice/Sediment Cores to Study Earth History
Instructor: *Rick Pomeroy, UC Davis School of Education*
This workshop will be application of chemistry testing to earth science using ice/sediment cores to study the earth's history.
NGSS aligned

Life Science

Increasing Student Engagement Through Modeling

Instructor: *Libbie Coleman, McClatchy High, Jennifer Horton, Lincoln High, and Heather Parker, Yuba City High*

Together we will build a model to explain the phenomenon of weight loss. In the process we highlight effective strategies to increase student engagement that are applicable to any science topic.

NGSS: HS-LS1-C

Physical Science

Forces: A Balancing Act

Instructor: *Liz Johnson, Cosumnes Oaks High, Haleigh Steele, Valley High School and Robert Brewer, Florin High*

Through a sequence of lessons, participants will develop a set of ideas (a model) related to Newton's Three Laws of Motion.

NGSS: HS-PS2-1