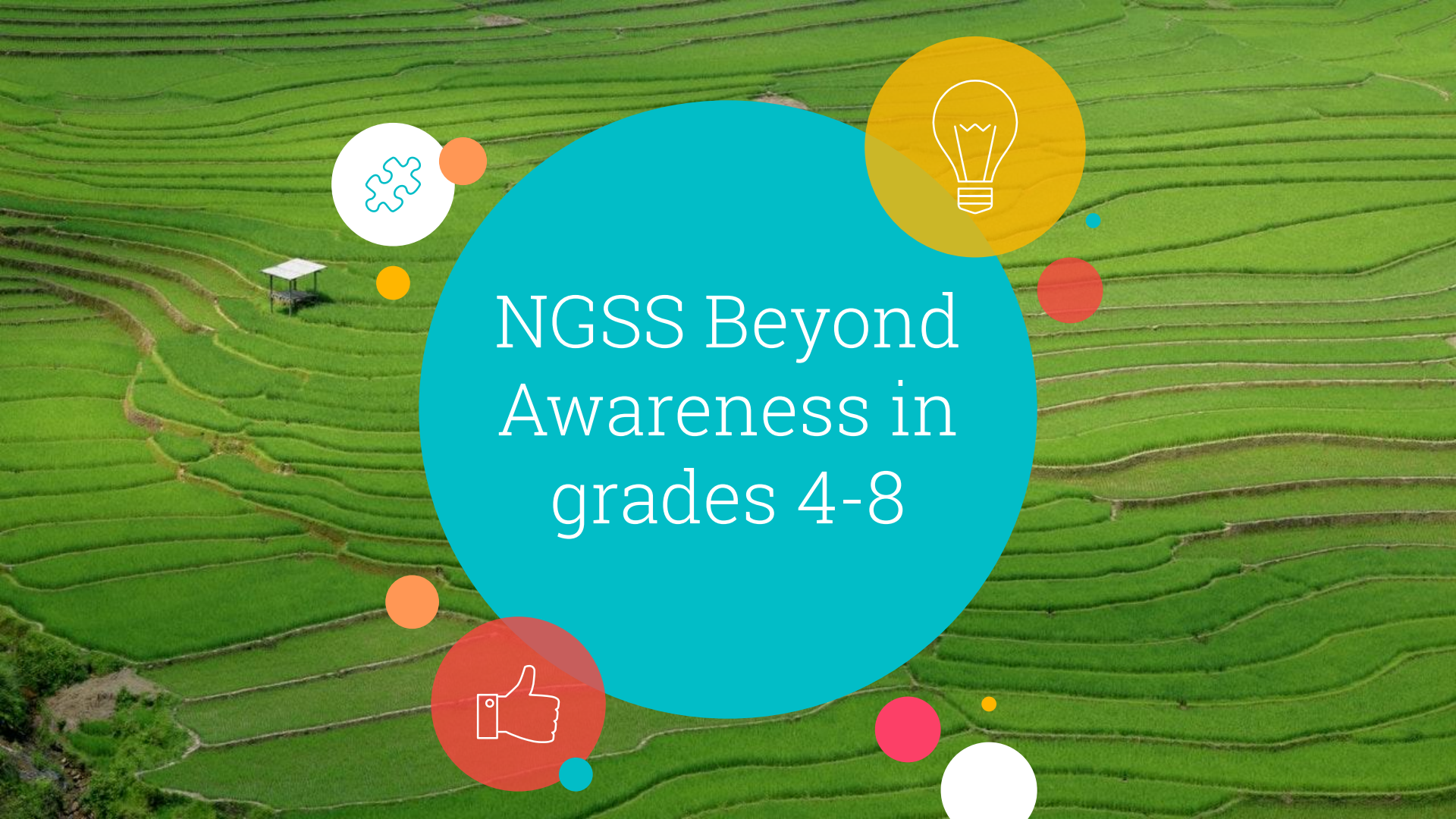

NGSS Beyond Awareness in grades 4-8

Hello!

We are Ian Kastelic from San Mateo-Foster City, CA and Alicia Payton-Miyazaki from Menlo Park, CA

Guiding Question

How can I incorporate the NGSS into my classroom using existing materials?

Awareness | **Transition** | **Implementation**

Stage 1: Initial Exposure to NGSS

Stage 2: Deepening Understanding of NGSS

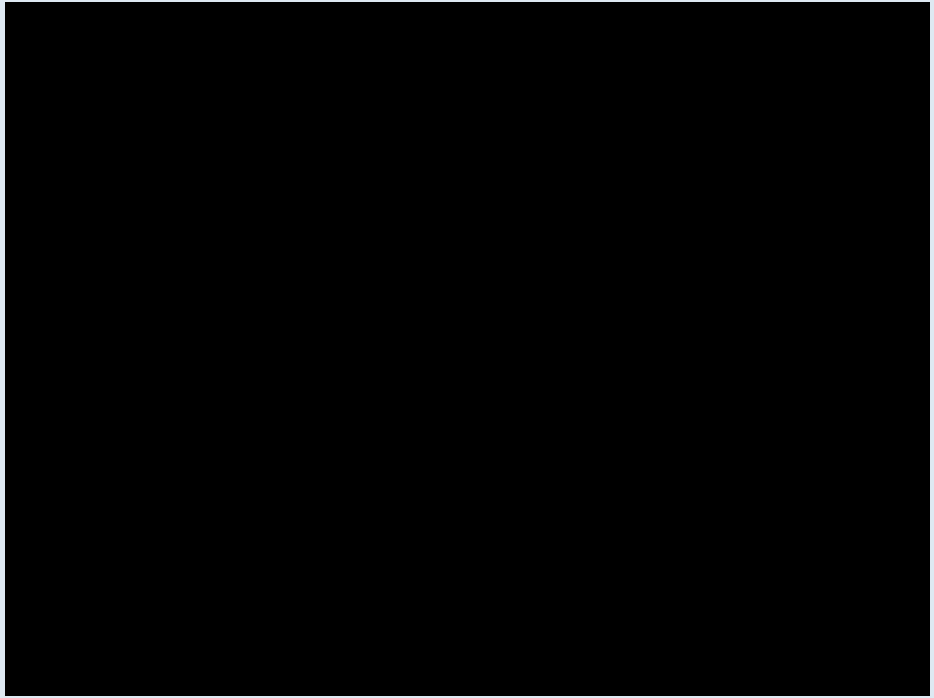
Stage 3: Planning Instruction around NGSS

Stage 4: Full Alignment of Instruction to NGSS

https://www.sdcoe.net/lis/ccr/Pages/sciencepd.aspx


What changes give you the biggest bang for your buck?

Newton’s Third Law



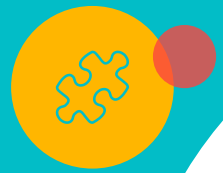
1. **ABC** – Activity before content (Lab before you blab)
2. Integration of SEPs* and CCCs
    a. **Modeling**
    b. **Argumentation from evidence**
3. **Assessment**

*Achieve and the NGSS suggested these 2 as THE place to start. “If you do nothing else, do these!”

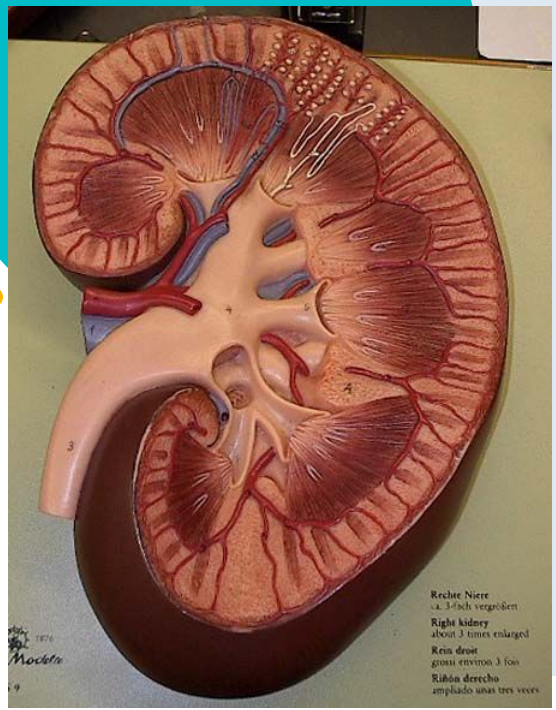
Activity before content (Lab before you blab!)

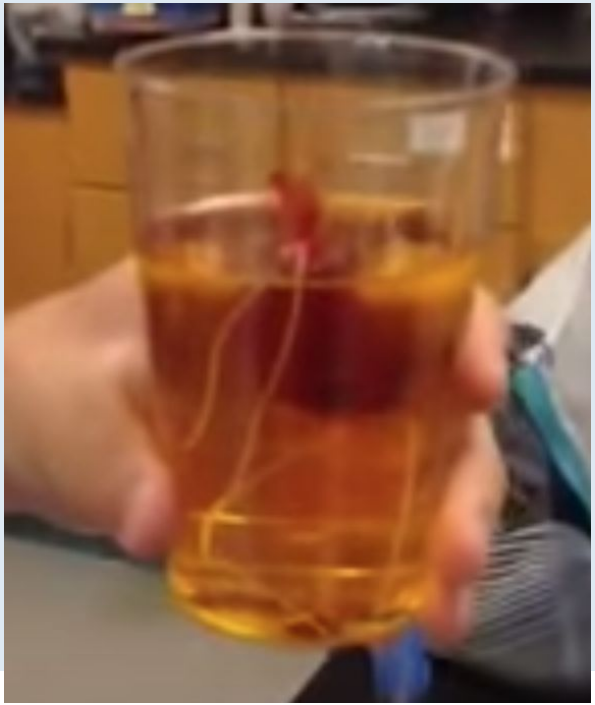
Image taken from You Tube
Find more ideas at
NGSSphenomena.com

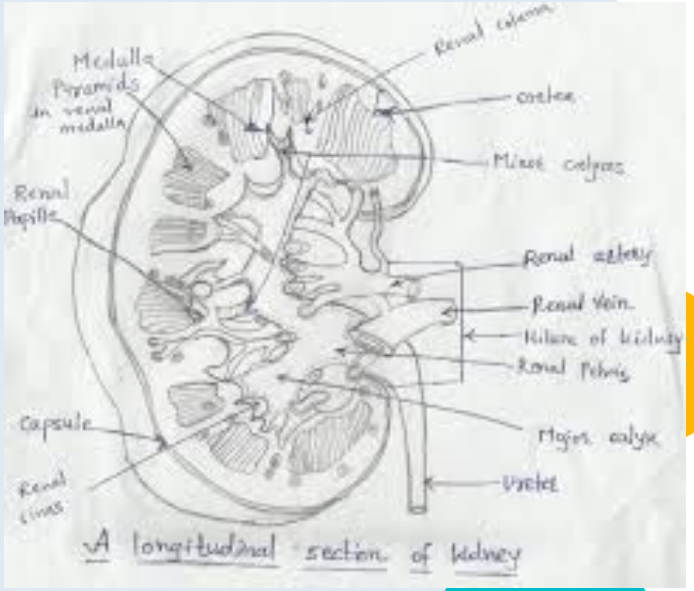
Integration of SEPs: Modeling



Different Types of Models







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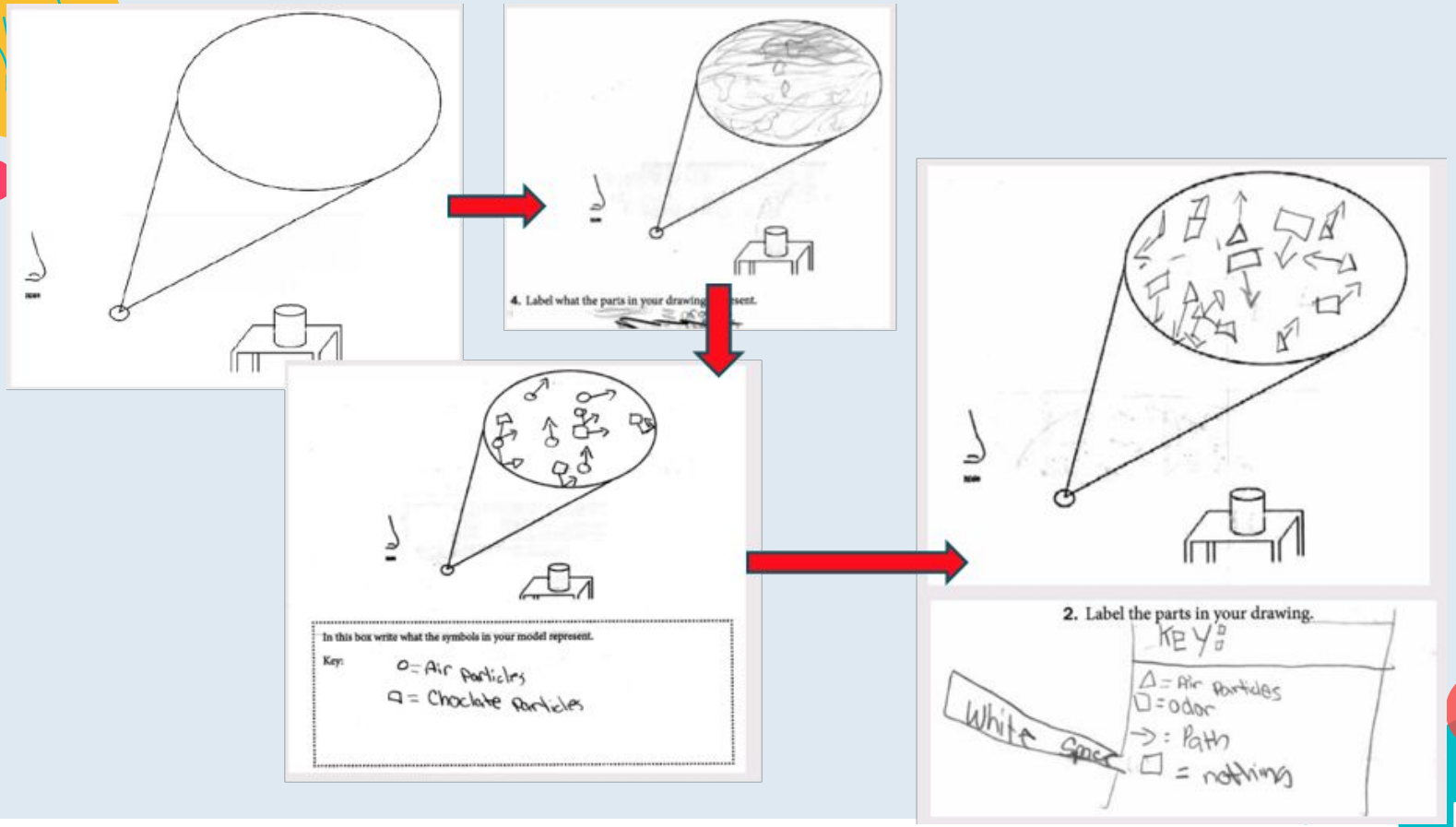


Courtesy Joe Krajcik, University of Michigan

Activities that support modeling

Developing and Using Models

1. **Have students create a model of a system that th… edit throughout the unit.**
2. Com…

What questions do you have about Developing and Using Models?

…*weaknesses* or *limitations* in **published** (curriculum, web, or even student etc) models. Identify and explain **strengths**.

4. Explain how a student-created model relates to a real world situation.
5. Use a model to predict changes in a real world situation.

Argumentation from Evidence

Activities that support Argumentation

Engaging in Argument from Evidence

1. **Present students with numerous pieces of data about a topic. Some purposefully contradictory, or vague. As a class have students evaluate which pieces of data are most relevant and accurate and why.** (Page Keeley prompts)

2. Have students engage in a class debate after gathering evidence from experiments they designed about phenomenon, debating what their data proves

3. As a class create a rubric for a successful design to solve a problem. Have students use *design thinking* to create a solution, share design solutions and have the class write or orally argue about how well different designs meet the rubric using evidence.

Activities that support Argumentation

Engaging in Argument from Evidence

4. **Use CER - Claim-Evidence-Reasoning**

5. Host a scientific debate about a current scientific situation in the news. (Should vaccines be required for all students to attend all schools? Is the money spent on the Mars rovers better used elsewhere?)

6. Make a padlet that is divided into Pro and Con for a topic and allow students to post

Assessment

Stanford SCALE project 5.LS.2-1

In this task, you will develop a model that will help you describe the relationships between parts of an ecosystem.

You will read a story about this ecosystem. We started a model of the ecosystem for you on the separate model sheet. Each time you read a new part of the story, you will add new information to the model. Then, you will use the model to help you answer questions.

You can insert graphs from Google Sheets

Part 1: The Australian Ecosystem

This is a true story that took place in Australia.	The Australian ecosystem had open spaces with small hills covered with plants, such as grass and trees.	One animal in this ecosystem was the kangaroo. Kangaroos eat different kinds of plants.
		

!	Find the model sheet. We have started the model for you by showing two parts of the ecosystem, the kangaroos and the plants. The arrow indicates how matter moves from the plants to the kangaroos.

1	Describe how matter moves from plants to kangaroos in this ecosystem.

Part 2: Introduction of the Rabbits

In 1859, a farmer brought 24 rabbits to Australia. There were many green plants for the rabbits to eat.	The rabbits grew strong and reproduced rapidly. By 1950, Australia had 600 million rabbits!	Unfortunately, the rabbits damaged the ecosystem. They ate almost all the green plants.
		

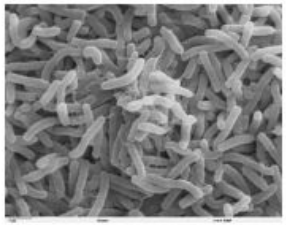
3a

- Add the **rabbits** to your model sheet.
- Draw one or more <u>arrows</u> to show how matter moves between rabbits and other parts of the ecosystem.

3b

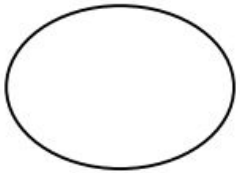
Why do you think many **plants** could not survive after **rabbits** were introduced to the ecosystem?

Part 3: Scientists Reduce the Rabbit Population

Scientists decided to try to lower the number of rabbits by releasing a disease into their environment.	The disease killed many of the rabbits. But the dead rabbits created problems for the environment.	There were many dead rabbits, but eventually decomposers cleaned them up.
		

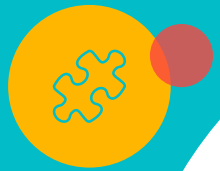
5a

Write the name of a **decomposer** in the circle below.



5b

- Add the **decomposer** to your model.
- Draw one or more arrows to show how matter moves between the decomposers and other parts of the ecosystem.



Cross Cutting Concepts

Chess experts and novices players were shown pieces randomly arranged on a chess board…

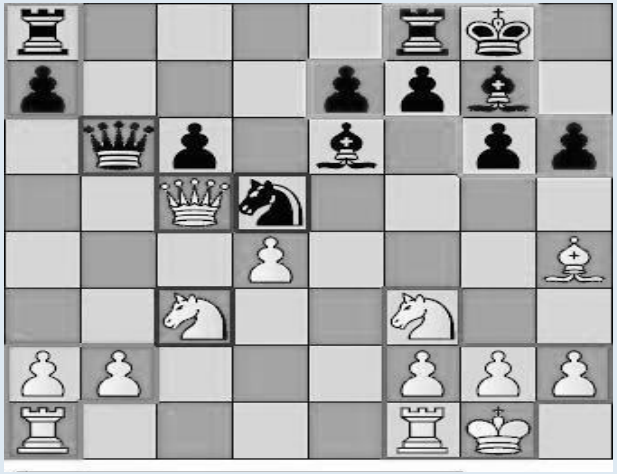
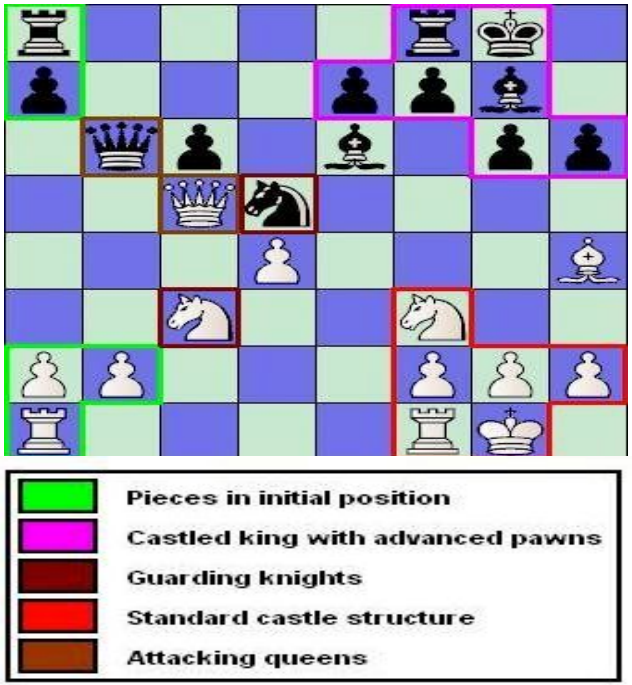


Image credit: Aranda, J. (2006, August 29). Fun with representations III – Hidden in plain sight. Retrieved May 23, 2015, from https://catenary.wordpress.com/2006/08/29/fun-with-representations-iii-hidden-in-plain-sight/

Experts grouped pieces together based on the **strategic moves** that the pieces could make in a game.



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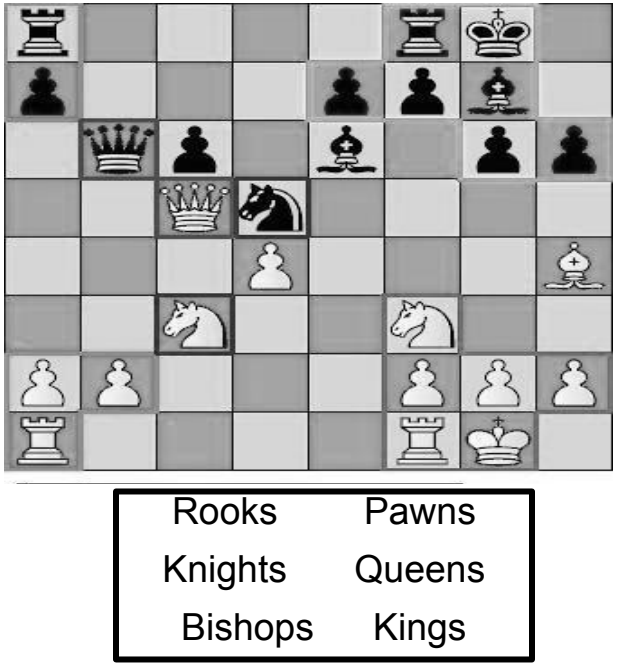
Novices only remembered **individual pieces**.



One goal of science education is to teach students think more like experts

» What if we gave students an expert-like conceptual framework to organize their ideas around?

From this

To this

How will the CCCs help students learn science?

1. A conceptual framework helps students make sense of new content and tackle novel problems

2. Allows students to be more flexible and creative with their science and engineering ideas

3. Helps students to develop their ideas over time

Structure and Function

1. How does the shape of _____ support its function?
2. Predict how changing the shape would change the functionality.
3. Design a different structure that might be able to perform the same function.
4. Describe how the properties of the materials in this system are important.

What questions do you have about the CCCs??

Samples from the Cross Cutting Concepts Questioning Stems found in Resources

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Resources

https://tinyurl.com/Flinn2019

Credits

Special thanks to all the people who made and released these awesome resources for free:

- Presentation template by SlidesCarnival
- Photographs by Unsplash
- Stanford SCALE SNAP Assessments
- Cal Academy of Science in CA
- NGSS @NSTA
- Craig T Gabler