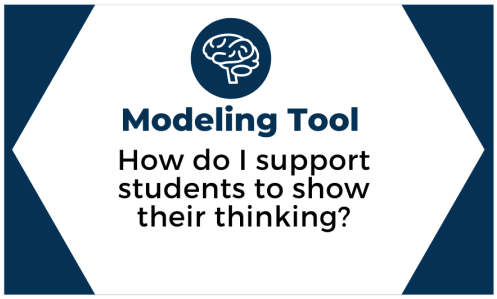
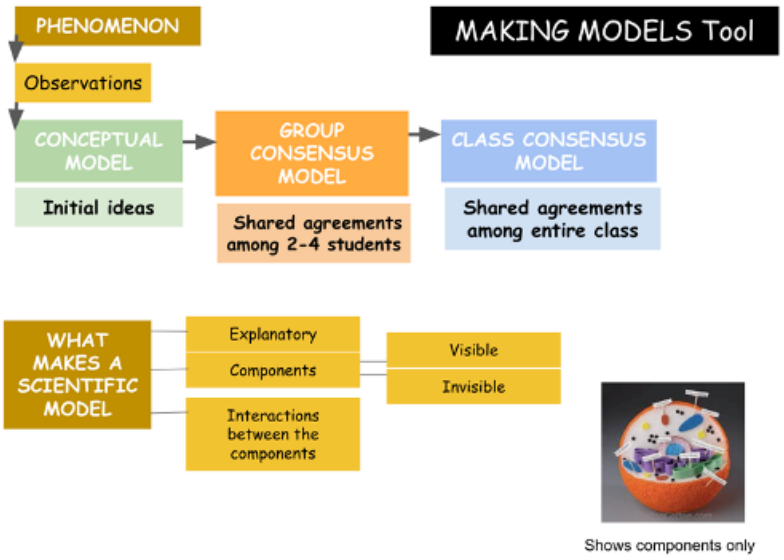
Best Practices Tool 2: Modeling

Learning Goal
Evaporation – Systems and Cycles



Origin Lesson
Learning About (What)

Understand the water cycle by having students act it out. Each student gets a note card with a water cycle word (evaporation, precipitation, transpiration, condensation, percolates, run-off). Students act out the word and without talking, they are to group themselves with other students they think have the same card. One at a time each group shows the rest of the class their action. Then choose a leader from each group and have that student dramatize the entire water cycle. Have the groups draw the water cycle on large butcher paper. Discuss the water cycle with the students.



Best Practices Modified Lesson
Figuring Out (Why and How)

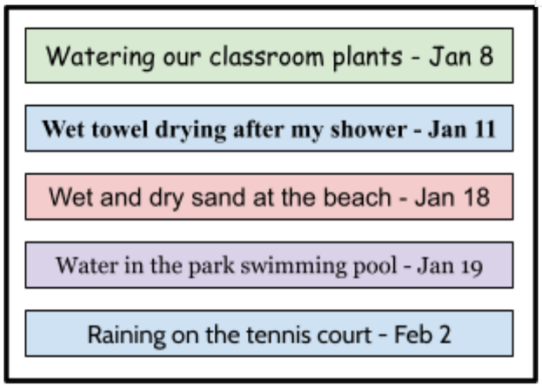
Have students spend 15 minutes observing the **Phenomenon**, a puddle outside. During this time, students should make a two-column table with the headers, “I Notice” and “I Wonder” to help stimulate observations and questions.

Ask students to draw and use words on a piece of paper demonstrating how they think the water got there[1], stays there[2] and will leave[3]. Encourage them to not just put down what they see, but also what is happening that they cannot see. [A similar model example of condensation is below].

Put students in partners and have them talk about what they drew and why. Ask students to think of other examples, both bigger and smaller, that they can think of that might be similar. Have students write their examples on

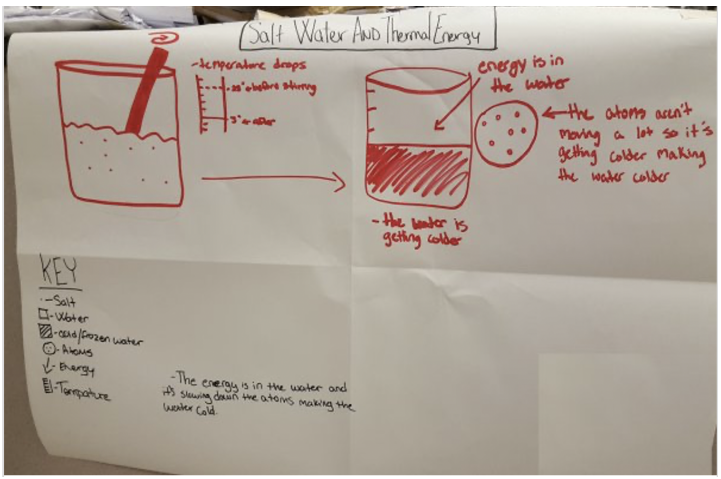
	sticky notes and keep a "phenomena tracker"* of them on the wall in the classroom. Use those examples to begin to investigate and collect evidence that helps students understand the mechanisms of cycles. Gradually revise their initial **models** over the course of the investigations until you can all reach a consensus model (entire class model) of the water cycle (really it is water cycles, with an "s" to be scientifically accurate.) Note: you can still have students do the above origin lesson, but don't start with it because it is out of context for them.

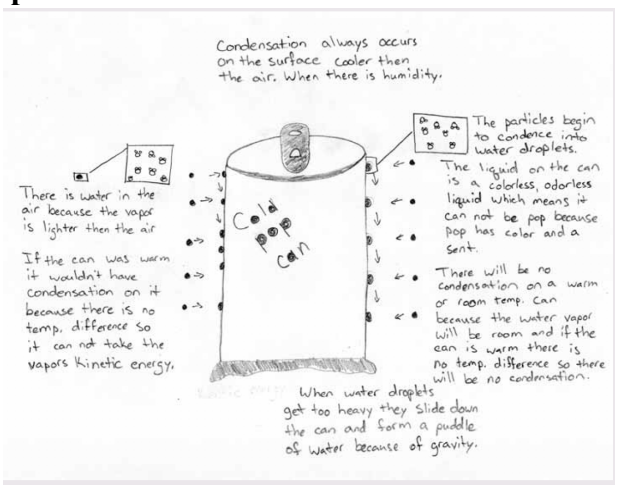
* A "Wall Phenomenon Tracker" is a way to keep track of like-phenomena that are similar to the initial one (in this case, the puddle) that your students could think of to explore and gather evidence about the concept of evaporation. [Examples of what might be included in a wall tracker of similar phenomena for this particular learning goal.]



Prompting Notes

For students to really understand new content, they must know why they are learning it and how it connects to other content. That is what distinguishes memorization from learning. The scientific practice of modeling and revisionist modeling provides that rationale. **Models (examples below) include BOTH the components that make up the system AND the interactions of those components.** Engaging Students in the Scientific Practices of Explanation and Argumentation. Understanding a framework for K-12 science education. Reiser, Berland, Kenyon. April/May NSTA 2012.





Guiding Discussion Lessons/Questions

Knowing what your students are thinking is probably the most important thing you can do as an educator. Starting with each student's initial, conceptual model build and transitioning to small and large group conceptual model builds gives you that preliminary information. Think of some of your top content standards that you teach and talk about how you would know your students really understand them besides them doing well on a test.

Additional Resources:

Engaging Students in Scientific Practices: What does constructing and revising models look like in the science classroom? Understanding A Framework for K-12 Science Education. NSTA K-12 Journals. March 2012. By Joseph Kracik and Joi Merritt.