2022 NSTA Houston Conference
"Demystifying Models: Approachable and Practical Modeling in the Science Classroom"

Session Packet  April 1st from 2:00 to 3:00

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Thank you for attending our session!

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Model Option 1

Question: What is happening when the boiling water hits the cold air?
Model Option 2

Question: What is happening when the boiling water hits the cold air?

Zoom-In Box

Water in the Pot  Water in the Air
Model Option 3

Question: What is happening when the boiling water hits the cold air?

Model Checklist
*I have shown the changes the water makes  *I have shown the cause of the water’s changes
*I have included labels to my diagrams  *I have done my neatest work with best spelling

Suggested Word Bank
*evaporation  *condensation  *particles  *water cycle  *water vapor  *solid  *liquid

Zoom-In Box

Water in the Pot

Water in the Air
Quick Start Guide: Tips to Consider when Modeling!

Starting to Use Models in Your Classroom

1. It’s always better to start with subtle changes first.
Think of some places where you could use models on a small classroom scale (i.e. pre or post assessments) and then once you get more comfortable, you could introduce models that students would add to over time across an unit.

2. Have your expectations and routine.
Make sure to think about what you want to have the students include in the end product. You will also need to think about how they are going to show the changes in their thinking. Many different routines can help show this growth in learning. Think of ways to communicate your expectations and routines to your students while keeping the modeling process open for them to show their ideas without being led to the correct answer. Your routines and expectations may vary and should include considerations about the age group that you are teaching and how comfortable your students are with science.

3. Establishing a classroom community where it is ok to be wrong.
Although it might not seem like it, modeling depends on students being ok with revising their thoughts when they are presented with new learning. In order for them to use models fully, students need to know they are in a safe space where it is not only ok to be wrong, but it is expected during the learning process.

4. Use a “Gradual Release” approach to teach students about modeling.
First, the teacher should demonstrate how to create a sufficient model (“I do” step). Then, the teacher should create the model with the students so everyone is completing the model together (“We do” step). Finally, the students should be able to create a model independently (“You do” step).

Building Student Understanding Using Models

1. Create opportunities for students to view and provide feedback on each others’ models via Gallery Walks or other methods.
When students can see each other’s work, they are able to get ideas and also see what is easy or difficult to understand in the model. They can have opportunities to agree and disagree while posing questions to the group about their model. To do this routine successfully, an expectation of a kind and respectful classroom community already needs to be in place. Many students will need to have this modeled and practiced before they can do it independently. Sentence stems and/or practice with a non-academic topic first may be useful to get students used to providing peer feedback.
2. Plan activities where students are revising their models based on feedback from peers and/or new science content learned. Miss Vitello and Miss LoPriore have found that color coding can be very helpful to help highlight this process. For example, having the students use a key where each color represents a different idea or concept that they are adding to their model. They suggest adding each new concept to the model as the students are learning it, rather than having the students add all of the new concepts all at once at the end of the unit.

3. The structure of making models should be varied--students should be making them individually and in groups. Students need to build capacity making models on their own and also as part of a group where ideas might differ amongst members. By varying the types of modeling activities, students can build the independence to work on models alone or in groups.

4. Students should defend their models using evidence from class. Models are a scientific document, so they should be able to go through the scientific process. To help demonstrate their learning, they should be able to explain what is happening in the phenomenon using evidence gathered from class. Evidence may be from investigations and experiments, articles or passages, videos, or class conversations.

Assessing Final Model Options:
Modeling Checklist: https://tinyurl.com/wo25gv

Student Modeling Rubric Google Document: https://tinyurl.com/vd7awgn

The modeling rubric encompasses five categories that are important to scientific modeling (Details, Clarity, Accuracy, Predictions, and Revisions) and can be assessed alone, in small clusters or collectively. Not all categories need to be graded at the same time for each model.

The instructor can choose when he/she assesses each component of the model.

Differentiation Options
- Word Bank
- Pre-made Key (to show what certain symbols on the model should signify)
- Picture of phenomenon with “Zoom-In Boxes” already featured on it
- Graphic organizers to help organize thoughts
- Sentence starters or sentence stems
- Differentiated questions while working on their model
- Related phenomena or adding additional connections to their model
- Present additional phenomena and have them use their model to try to explain it