

8/1/2012



Assessing with  
Learning  
Progressions in  
Science

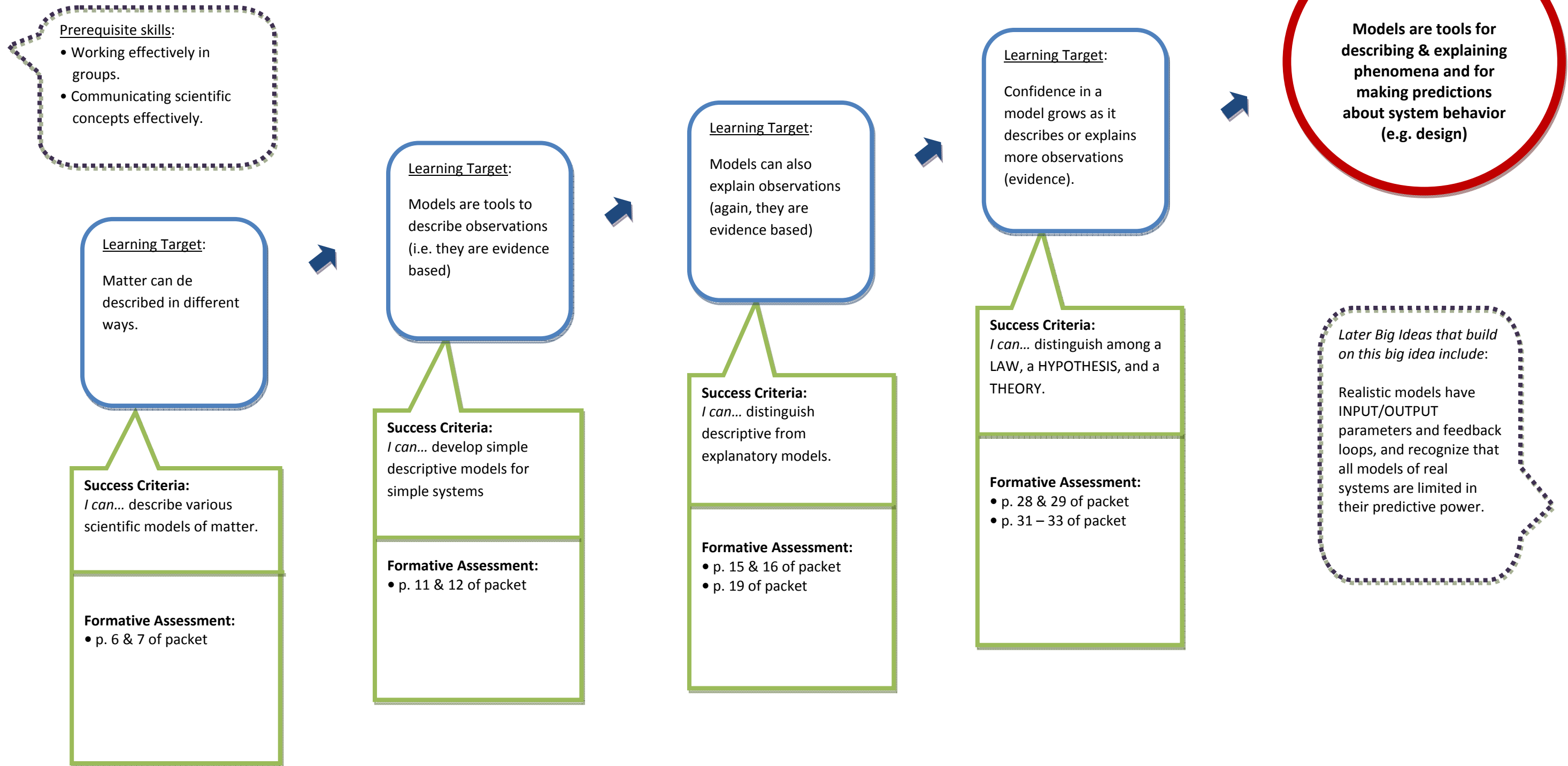
## STC MODELS AND DESIGNS

Photo by Joanne Johnson

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# Learning Progression

## FOSS Models & Design



## AGENDA

Winter 2012

- Content Pre-test (~30 minutes)
- Initial Ideas: Record your thoughts (~10 minutes)

*What is a model?*

*How do scientists use models?*

*What questions do you have about scientific models and how they are used?*

- Whiteboard (review protocols): *Share your thinking with your group and develop a white board to share that represents your consensus ideas to the INITIAL IDEAS questions.* (~25 minutes)
- Form Groups & Develop Group Norms (~5 minutes)
- Intro. & Overview of **Chemistry for the Informed Citizen** Packet (~5 minutes)
- Act. 1: Work through p. 1-7 of packet (~30 minutes)
- Formative Assessment: Discussion of responses to questions 1 thru 5 on p. 6 & 7 of packet (~30 minutes)

## LUNCH BREAK

- Act. 2: Work through p. 7 - 16 of packet (~45 minutes)
- Formative Assessment: Discussion of responses to questions #1 thru 4 on p. 15 & 16 of packet (~30 minutes)
- Act. 3: Work through p. 17 - 19 of packet (~25 minutes)
- Formative Assessment: Discussion of responses to questions #1 & 2 on p. 19 of packet (~25 minutes)
- Act. 4: Work through p. 26 - 33 of packet (~25 minutes)
- Formative Assessment: Discussion of responses to questions #1 – 3 on p. 27 & 28, and #1 & 2 of p. 33 of packet (~30 minutes)
- Instructor Comments: Scientist's Ideas about models and the use of models for design. (~12 min.)
- Reflection: *Review your Initial Ideas & List of Questions from the INITIAL IDEAS. Record your reflections on how your thinking about models and how they are used in science has changed, and describe which specific activities had the biggest effect on modifying your understanding and why.* (~15 minutes)
- Whole Group Discussion: Classroom Applications (~25 minutes)
- Content Post-test (~30 minutes)

RESOURCES USED:

- Inquiry-based Classroom Activity #1 & #2 from the **Chemistry for the Informed Citizen** (included on disc)
- **IPCC 4<sup>th</sup> Assessment Report: Summary For Policy Makers** (Introduction & Human & Natural Drivers of Climate Change sections) [www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf)

Name: \_\_\_\_\_

1. What is your definition the word “MODEL” as used in science?
2. What is your definition the word “THEORY” as used in science?
3. What is your definition the word “HYPOTHESIS” as used in science?
4. What is your definition the word “LAW” as used in science?
5. Check whether each statement in the table below is more like a scientific theory or more like a scientific law.

Statement	Law	Theory	Explanation
As the number of gas particles increases, the volume of a flexible container increases.	<input type="checkbox"/>	<input type="checkbox"/>	
As gas particles move, they collide with the walls of a flexible container, providing an outward force on the container.	<input type="checkbox"/>	<input type="checkbox"/>	
Elements in the same group (column) on the periodic table have similar properties.	<input type="checkbox"/>	<input type="checkbox"/>	
The number of outermost (valence) electrons governs an element’s chemical reactivity.	<input type="checkbox"/>	<input type="checkbox"/>	

6. Explain the difference between each pair:

a. hypothesis vs. theory

b. theory vs. law

c. theory vs. model

7. You share with a friend some of what you have learned about atomic structure, either from this class or a previous class. You're careful to use the words "model" and "theory" as you describe scientists' different ideas of the atom over the past century or so. Your friend asks, "If the current model of an atom is only a theory, why should I believe it?" Comment on your friend's use of the word "theory." How is this usage different from how a scientist might use the word theory?

8. What role do models play in scientific understanding?

9. What role do models play in designing new products?