


**Visible Learning in
the Science
Classroom**

John Almarode
www.johnalmarode.com
@jtalmarode



Learning Goal:
We are learning **what works**
best in the PreK – 12 science
classroom.



**Success
Criteria**

- 1) I can explain

- 2) I can describe

- 3) I can describe

- 4) I can define and give

- 5) I can apply

What is science?

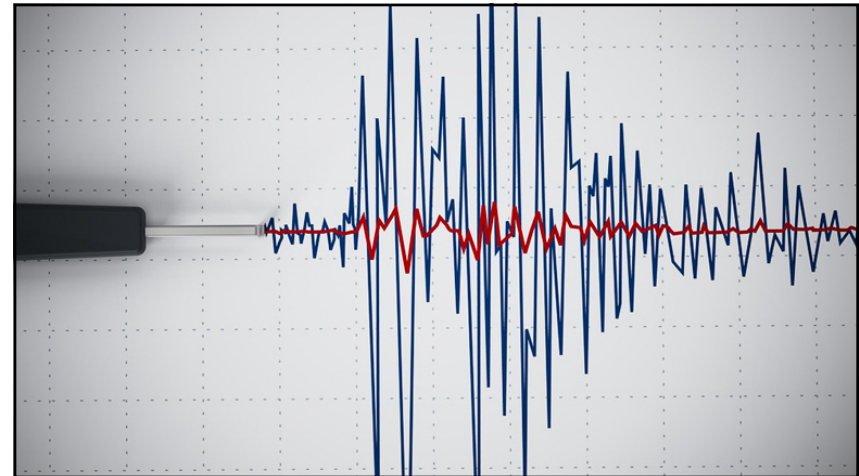
Definition	Examples

1. Surface Learning is the initial learning of concepts and skills.
2. That doesn't mean we're not working on comprehension; it's just that the depth of thought isn't there, yet.
3. This learning is the initial level that begins with development and understanding.
4. Surface learning is not shallow learning. It should not be mistaken for engaging in procedures that have no grounding in conceptual understanding.
5. Through the consolidation of surface learning, students begin to retrieve information efficiently and make room for more complex problem solving.

1. Students move to deep learning when they plan, investigate, and elaborate on their conceptual understandings, and then begin to make generalizations.
2. This is not about rote learning of rules or procedures. It is about students taking the surface knowledge (which includes conceptual understanding) and, through the intentional instruction designed by the teacher, seeing how their conceptual understanding links to more efficient and flexible ways of thinking about the concept.
3. Often, this is accomplished when students work collaboratively with their peers, use academic language, and interact in richer ways with ideas.

...to take the reins of their own learning, think meta-cognitively, and apply what they know to a variety of real-world contexts.

Almarode, Fisher, Frey, & Hattie, 2018



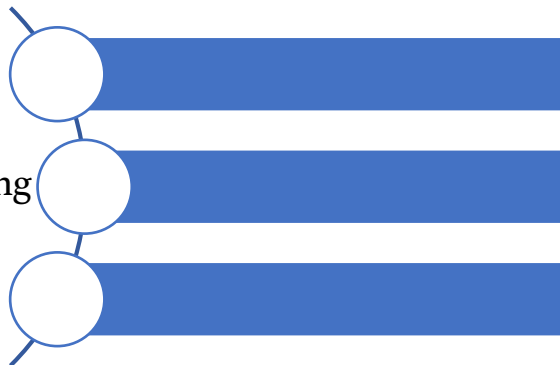
The Barometer of Influence

Make Student Thinking Visible

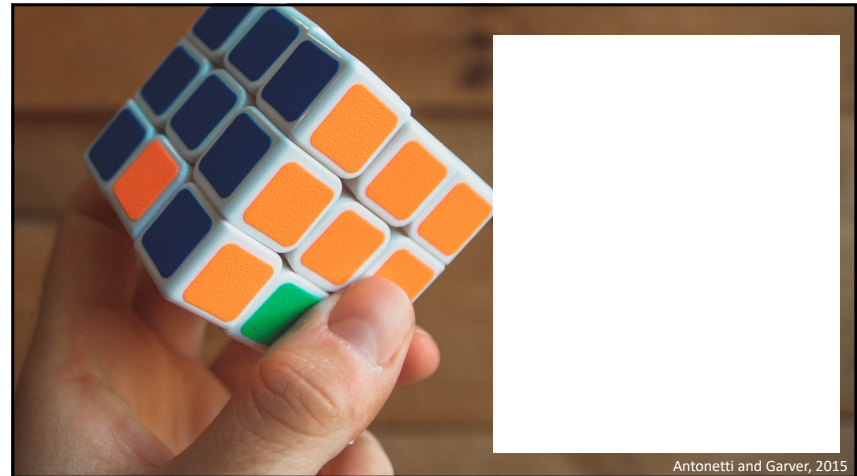
1. Ask students to ob_____ and de_____ what they “see” in wor_____d ex_____s.
2. Build ex_____ and int_____ associated with solutions.
3. Re_____ or support their so_____n or ap_____h with ev_____.
4. Make co_____ to authentic scenarios.
5. Consider different v_____ and pe_____.
6. Capture the big i_____ and form co_____.
7. Promote inquiry or the a_____ of more q_____.
8. Uncover the co_____ by going below the s_____.

Ritchhart, Church, and Morrison, 2011

Meaning Making



Medina, 2014



Antonetti and Garver, 2015

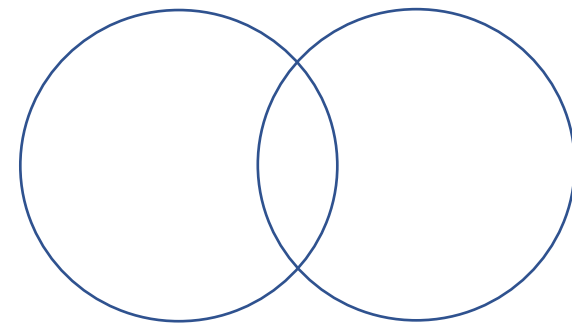
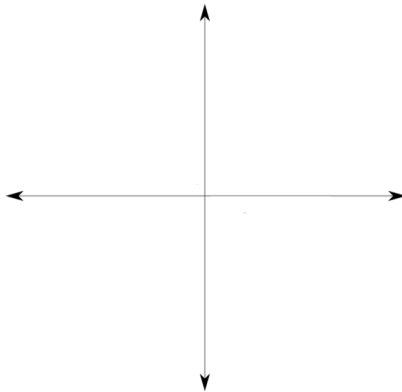
Complexity versus Difficulty

A car odometer registered 41,256.9 miles when a highway sign warned of a detour 1,200 feet ahead. What will the odometer read when the car reaches the detour? (5,280 feet = 1 mile)

- (a) 42,456.9
- (b) 41,279.9
- (c) 41,261.3
- (d) 41,259.2
- (e) 41,257.1

Did you use the calculator on this question?

Yes No

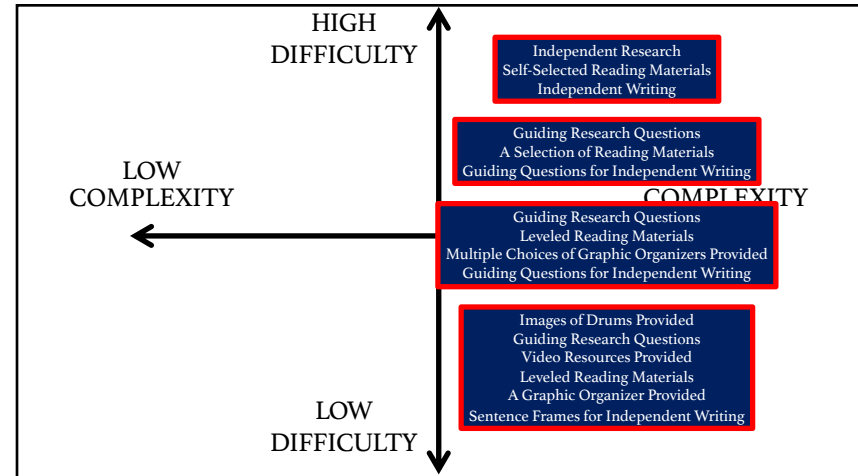


Harris County's Museum of Music

Challenging Task

Cooperative Learning Task: You and your team will create two different drums using different materials for each drum. Please be sure that the drums make different sounds. When finished, all groups will play their drums for the class and explain what materials were used.

Individual Writing Prompt: Tell me what you learned about what causes a vibration.

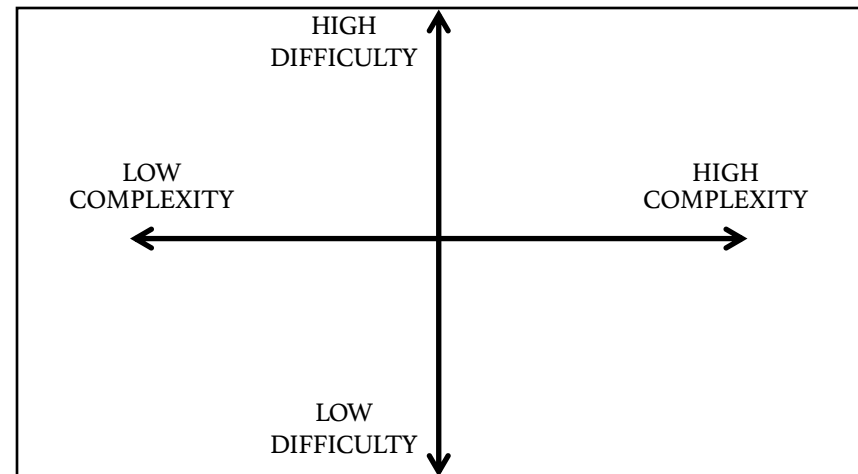



Harris County Nature Center

Challenging Task

Cooperative Learning Task: Make a brochure for your nature center. This brochure will be sent to schools to let them know about field trips to your nature center. This brochure should tell the schools what the students will learn, see and do at the nature center. Give an example of what they will learn about adaptations.

Individual Writing Prompt: Create a list of 5 - 7 questions that people might have about animal adaptations. These questions are sometimes called "Frequently Asked Questions or FAQ's!" After you create the questions, you will need to research the answers. Then, you will create a flyer that has the questions and answers on it.



Learning Intentions describe
_____.

Success Criteria specify for students

_____.

Unless teachers are clear about what they want students to learn and what success looks like,

_____.

Ainsworth, 2015

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

Cause and Effect

- Cause and effect relationships are routinely identified. (4-PS4-2)

Systems and System Models

- A system can be described in terms of its components and their interactions. (4-LS1-1), (LS1-2)

Learning Intentions

Content Learning Intention: I am learning about the parts of a plant and how those parts help the plant to survive.

Language Learning Intention: I am learning to use scientific language in making arguments from evidence about plants.

Social Learning Intention: I am learning to work collaboratively with my peers in making observations about plants.

Learning Intentions

Content Learning Intention:

Language Learning Intention:

Social Learning Intention:

Success Criteria

I can identify the parts of a plant.

I can describe the functions of specific parts of a plant.

I can explain how the functions of plant parts support reproduction, photosynthesis, and specific adaptations.

I can hypothesize/justify about the ability of specific plants to survive in specific environments.

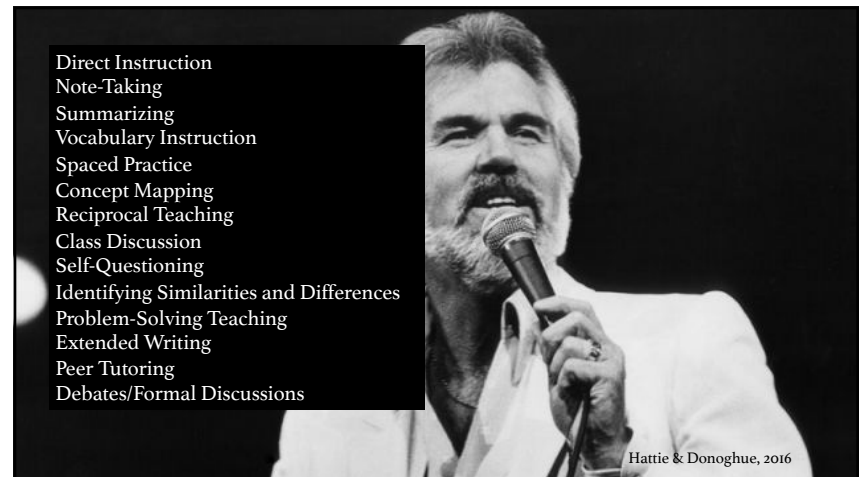
Success Criteria

I can...

I can...


I can...

I can...



- Direct Instruction
- Note-Taking
- Summarizing
- Vocabulary Instruction
- Spaced Practice
- Concept Mapping
- Reciprocal Teaching
- Class Discussion
- Self-Questioning
- Identifying Similarities and Differences
- Problem-Solving Teaching
- Extended Writing
- Peer Tutoring
- Debates/Formal Discussions

Hattie & Donoghue, 2016



Success Criteria

- 1) I can **explain** the key messages from the Visible Learning research.
- 2) I can **describe** the three phases of the learning process in science.
- 3) I can **describe** characteristics of learning tasks that promote surface, deep, and transfer learning.
- 4) I can **define and give** examples of clarity in the science classroom.
- 5) I can **apply** my learning to my own science classroom.