Making Thinking Visible in the Science Classroom

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Born and raised in Buenos Aires, Argentina. I’m a passionate biologist, that fell in love with teaching. I want to help my students assess their own learning and practice scientific thinking dispositions continuously.

"Science classes are a wonderful excuse for adults and children to keep asking questions"
- Ivana Romero

Originally from Wisconsin, I am currently teaching in Buenos Aires. I am always working to find innovative ways to create a community of learning and culture of thinking in my classroom.

"The challenge to teaching is finding the right balance – offering students support in their thinking and allowing them the room they need to discover their own!"
- Rebecca George
Let's give it a try...

A routine for exploring works of art and other interesting things

What do you see?  What do you think about that?  What does it make you wonder?
EAT
Mantis Shrimp

Problem: Crabs and sea snails are delicious and plentiful but heavily armored.
Solution: This crustacean has little spring-loaded punching arms that strike with over 200 pounds of force, momentarily heating the water to nearly the temperature of the sun. They can smash clamshells or disarm crabs by blowing off their pincers.
Problem: The open seafloor is a dangerous place for a slender fish.
Solution: The pearlfish finds shelter in a sea cucumber's anus. It waits for its victim to breathe (yes, sea cucumbers breathe through the wrong end) and just shimmies right in. Sometimes they go up in pairs and, scientists suspect, have sex inside. If that weren't bad enough, the pearlfish may also eat its host's gonads.
Problem: Fungi often depend on wind to spread their spores, but a dense rain forest is windless.
Solution: The *Ophiocordyceps* fungus invades an ant's body and surrounds its brain. Then it chemically mind-controls the bug up into the trees and orders it to clamp down on a leaf and anchor itself, before erupting from the ant's head as a stalk and raining down spores on the ground below.
Problem: Juicy grubs are hiding somewhere under tree bark, but how to find them?
Solution: Madagascar has no woodpeckers—which may explain the aye-aye. By tapping on branches with its long, skeletal fingers, this nocturnal primate can tell where the insect larvae are inside. It then gnaws through the wood and fishes out the grubs with its E.T.-like middle digit.
Learning Objectives:

- What is visible thinking and why is it important?
- What are thinking routines & how can I use them?
- What are some tips for trying out a routine in my classroom next week?
Children must be taught how to think, not what to think.”
– Margaret Mead
What is visible thinking?

Visible Thinking...

- Is the product of a number of years of research
- An observable representation of students’ thoughts as they think through an issue, problem, or topic
- A framework of routines for making students' thinking visible to themselves and one another, so that they can achieve deeper understanding
Simple practices that can be used across grade levels and content areas. They should become part of the classrooms' culture and the ways in which students go about the process of learning.
What makes these routines work?

Each routine:

- Can get used over and over again in the classroom
- Consists of only a few steps: easy to learn and teach
- Is goal oriented: it targets specific types of thinking
- Can be used across a variety of contexts
- Can be used by the group or by the individual
What are thinking routines?
“Real Life” Examples

How do we use routines in our Science classrooms?
Students created mind maps elaborating on their connections. They provided feedback and discussed their work with their classmates.
Students observed an image and made interpretations based on their previous knowledge. They asked questions inspired by the image and what they still don’t understand.
Students carefully observed an image with some elements that were new to them. They asked questions out of curiosity and making connections to what they already knew.
All students were given the opportunity to have a voice as they shared their ideas and questions and responded to the ideas and questions of their peers as they looked at different versions of the geologic time scale.
Students generated a list of their ideas, sorted these ideas and made connections between them to create a concept map about the classification of living things. 

“We have to think about how close the post-its are together because that shows how connected they are.”

Generate-Sort-Connect - Science 6
Students wrote headlines for the topic that summarized and captured the key ideas that they thought were significant.

**Headlines - Science 6**

- Bacteria: the Smallest but most affective Organism in the world
- Evolution: you are more related to a banana than you thought
- Your all mutants, how a single mutation can decide the fate of a species
- Survival of the fittest; a real-life hunger games
- Top 5 bones/organs that you don't need
### Pros and Cons?

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<thead>
<tr>
<th>Smiley Face</th>
<th>Frown Face</th>
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<tbody>
<tr>
<td>Students need training in these routines; they might not be easy at first.</td>
<td>As they practice, they get better: better connections, more interesting questions, faster to identify what challenges them.</td>
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<td>Sometimes it is difficult to identify what routine to use (thinking disposition comes first!).</td>
<td>Routines can be completely adapted to your needs.</td>
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<td>A culture of thinking is necessary so these routines become habits and are not just activities.</td>
<td>Routines emphasize learning being a journey as thoughts develop and grow.</td>
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Let's Try It Again...

I used to think... A routine for reflecting on how and why our thinking has changed... but now I think...
<table>
<thead>
<tr>
<th>Me</th>
<th>You</th>
<th>Space</th>
<th>Time</th>
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<tr>
<td>How do I make my own thinking visible?</td>
<td>How do I make my students' thinking visible?</td>
<td>How is the space in the classroom organized to help facilitate thinking?</td>
<td>How do I give thinking time? How does thinking develop over time?</td>
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</table>
Survey

Please fill in the AASSA survey in **SCHED**.

You can also access through:

http://tinyurl.com/ybzvfy2y
Sources and Useful Websites:

- Making Thinking Visible. By R. Ritchhart, M. Church and K. Morrison
- www.visiblethinkingpz.org
- http://www.pz.harvard.edu/projects/visible-thinking
- http://www.rcsthinkfromthemiddle.com/thinking-routines.html
THANKS!

What are your questions?

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