wasatch range writing project
By Macie Wolf

Lesson Title: Cubing a Critter II: Collecting Evidence to Support a Scientific Hypothesis

Burning Question: Can I create and implement effective quick write prompts and use strategic writing strategies to stimulate scientific inquiry, deeper thinking, and richer responses in my science students as they collect evidence to support their scientific hypotheses?

Objectives: This lesson explores:

- The careful design of provocative quick write prompts that do not just ask students to recall content verbatim, but instead asks them to extend their thinking and inquiry skills and to write richer responses.

- Cubing as a strategic inquiry writing strategy that can help students to analyze science concepts in depth as they prepare to write and as a means of collecting evidence to support scientific hypotheses (arguments/claims).

Context: This lesson was created to be taught in a 7th grade science classification unit. It could be adapted as an inquiry lesson for any grade level or subject and can be useful in teaching argument writing. Instruction to develop critical definitions, concepts and criteria related to the classification, structure, functions, needs and habitats of invertebrate animals should be developed prior to presenting this lesson.

Materials:

- A small 3-D object /specimen that has 6 sides for teacher to model inquiry and cubing strategy to class. I use a rock that has fossils embedded, but anything would work as long as it is not round in shape.

- 1 large (5 inch) dice or cube and 1 small (1 inch) dice or cube per team of students

- 1 different invertebrate specimen per team and one research fact sheet to match the specimen for each student on the team

- 1 *CUBING* strategy sheet for each student

- Chart paper, markers, notebooks, pencils

Time Span: 2-3 days for pre-writing activities, 1-2 days for writing and 1-2 days for processing.

Procedures:

1. Display quick write on whiteboard and inform the class of their objectives.

Would you like to live the life your invertebrate animal lives? Describe why you would or would not like to be that kind of creature. Support your hypothesis (claim/argument) with an explanation based on your previous learning about invertebrates.

2. Group students in teams of 3-5.

3. Display object and tell students that science inquiry is like detective work – you have to gather clues and evidence to find out more about what you are studying and to make hypotheses (claims/arguments) based upon your observations. Actively look at the top, bottom, and all sides of the object, making simple observations of each side. Explain that when scientists write about something they want to look at it from all angles and from all perspectives.

4. Introduce and explain the *CUBING* strategy sheet and explain the strategy by modeling with the large dice.

5. Have one student from each team come up and roll the dice, and using the teacher's object they should consult with their team and do the activity noted on the *CUBING* sheet. Students can choose to roll one more time if they do not like the first activity. All teams must roll until they get a number that has not been chosen.

6. Give each team one sheet of poster/chart paper, their own small cube/dice (each team gets a different color), a specimen of an invertebrate critter (or evidence of that critter), one colored marker per student, and a research fact sheet about their animal for each student on the team. Each team member should then take turns rolling the dice and doing the appropriate activities on their chart paper. Each student in a team of 3 should roll twice and complete two activities on the *CUBING* sheet on their chart paper.

7. Place posters on the wall and conduct a gallery walk to learn about all the invertebrate animals.

8. Students then choose one of the invertebrate animals studied, research to support their arguments/claims using previous learning notes and evidence gathered from posters, write their quick write and then share it with a peer response/edit group. They will then revise as needed before handing in to teacher for final scoring.

Extensions:

- Cubing can be differentiated for readiness, content, or interests, language development by color coding cubes and by placing words (tasks) on cubes instead of numbers or dots. Suggestions include: Describe it; Connect it; Change it; Solve it; Question it; Rearrange it; Satirize it; Evaluate it; Relate it; Contrast it; Investigate it; Cartoon it; Plot it; Personify it; Argue it.

- For gifted students the teacher may want to access and print current or provocative research articles from the web to use as topics of study. *Science Daily* is a website that offers current research that is very student-friendly and can provide rich evidence for support of hypotheses (claims/arguments).

Rationale: Quick writing in science requires an extra effort on the part of the teacher to design thought-provoking questions that stimulate inquiry in their students. As George Hillocks in *Teaching Argument Writing* asserts, "Definitions are important in research. They provide criteria allowing us to test what we know and to generate new concepts." He also maintains that definitions, "clearly provide the warrants and their backing for arguments of judgment." Cubing is a very versatile strategy which allows teachers to differentiate on many levels. It can increase thoughtfulness and rich inquiry in students so that they can apply, justify, imagine and demonstrate opinions and collect scientific evidence to support hypotheses in their writings.

Observations are at the heart of conceptual learning in science and the ability to communicate these observations is essential to internalization.

Cleland, Rizzo, & Zambo

The writing process is a discovery technique that gets students personally and emotionally involved…a way of getting them to look once again at the fish.

Bob Tierney

Common Core standards addressed include: R.7.1, R.6.7, RST.6-8.1, WHST.6-8.1, WHST.6-8.2, WHST. 6-8.9, W.7.1, W.7.2, W.7.3, W.7.4.

Resources:

Cleland, Jo, Rillero, Peter, Zambo, Ron. " Effective Prompts for Quick writes in Science and Mathematics." *The Electronic Journal of Literacy Through Science(2)* Fall 2002- Spring 2003 http://ejlts.ucdavis.edu/article/2003/2/1/effective-prompts-quick-writes-science-and-mathematics

Dean, Deborah. *Strategic Writing*. Urbana, Illinois: National Counsil of Teachers of English, 2006. Print.

Gallagher, Kelly. *Teaching Adolescent Writers*. Stenhouse: 2006. Print.

Strong, Bill. *Coaching Writing in Content Areas*. Pearson. 2011. Print.

Tierney, Bob. *Let's Take Another Look At the Fish: The Writing Process as Discovery.* *http://www.nwp.org/cs/public/print/resource/857*

http://www.sciencedaily.com/

Hillocks, Jr., George. *Teaching Argument Writing*. Portsmouth, NH. Heinemann: 2011. Print.

CUBING

Adapted by Macie Wolfe

Description: Cubing is a literacy strategy which uses a concrete visual of a cube with its six sides and enables students to explore a topic from different angles or perspectives.

Application: To introduce cubing, start with a familiar topic and model the process. Then assign more complex topics once students have a grasp of how the process works. The students examine the topic using the prompts from the six sides of the cube. Prompts can differ, but basically students are asked to:

1. **Describe it/illustrate it**
    - How would you describe this item/ living thing/topic/issue/event/person?
    - What characteristics/properties does it have?
    - What does it look like? (If applicable, include color, shape, size, etc and use whatever senses are safe to use to gather observations)

2. **Compare it**
    - What is it similar to or different from?
    - What inferences might you make about it?

3. **Associate it**
    - What does it remind you of?
    - How does it connect to other things/topics/issues, etc?

4. **Analyze it**
    - How/why did it happen?
    - What is its contributing factors/smaller parts or pieces?
    - How it is made/what is it composed of?
    - How is it adapted to live where it lives, do what it does, etc?

5. **Apply it**
    - What can it do/what can you do with it/how can it help?
    - What lessons /understanding does it generate?

6. **Argue for or against it**
    - I support/oppose this because…
    - This works because…
    - I think this is good/bad because…
    - I would like to be like this because…