Mr. McDonald's Fifth-Grade Class

Because Bill McDonald wants to check in frequently with his students, a short, timed writing exercise is ideal. Short, timed writings allow students to consider a topic with an increased sense of urgency due to the time constraints. Such scenarios can translate to the real-world environment in which a writer, a surgeon, or a chemist needs to convey ideas in a coherent, brief manner. Used as formative assessment, short writing assignments give students immediate feedback. Table 3.8 shows Mr. McDonald's lesson plan.

Table 3.8: Fifth-Grade CCSS for Writing and NGSS Lesson Plan on Life Sciences

Crosscutting concept	Energy and Matter: Flows, Cycles, and Conservation
Core ideas	From Molecules to Organisms: Structures and Processes—Organization for Matter and Energy Flow in Organisms
Lesson purpose	Grasp the survival needs of organisms by writing a series of short paragraphs
Focus lesson strategy	Timed writing
NGSS 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	
CCCS • Writing standards: 4. Produce clear and coherent writing in which the development and organization are appropriate to the task, purpose, and audience. (CCSS.ELA-Literacy.W.5.4) 5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (CCSS.ELA-Literacy.W.5.5)	

Source: Adapted from NGA & CCSSO, 2010a, p. 21, and Achieve, 2013a, pp. 30, 32, 129

Examining the Concepts and Language

Fearn and Farnan (2001) note that short, prompt-driven student writing examples can be as insightful as longer, more in-depth pieces, because they provide a chance to do a quick assessment of how well each student is doing. Students with frequent, short opportunities to engage in science writing build confidence alongside skill. Some teachers ask students to graph the number of words they have written as a way to track their writing stamina and endurance, skills that are implied throughout the Writing anchor standards (especially CCRA.W.5 and CCRA.W.7).

In Mr. McDonald's class, students are "developing a model to describe the movement of matter among plants, animals, decomposers, and the environment" (Achieve, 2013a, p. 29). Specifically, they are studying food webs.

To guide students to tap into their background knowledge, Mr. McDonald gives his class five minutes to respond to the following prompt individually in writing: "What do animals need to survive?

What do plants need to survive?" As students respond, Mr. McDonald walks around to look over their writing.

Jake's response (figure 3.12) indicates that he has some foundational understanding of both plant and animal needs.

> I think that animals need water and food. Sometimes they get food by eating other animals. Other times they eat plants. Animals also need a place to live and protection from other animals that might eat them. Plants need sunlight and water. I think they use sunlight, sort of like animals eat food. They also need water to make food for themselves. Then, they grow taller and get more leaves.

Figure 3.12: Student response to the writing prompt, What do animals and plants need to survive?

Modeling to Expand Learning

After a brief review of a few examples of student writings, Mr. McDonald determines his next steps. Based on the students' writing, he decides to move forward with some terminology and deeper explanations of ecosystems and biological communities. He explains that some animals are autotrophs, which means they make their own food. Jake and his classmates jot down a few ideas, as Mr. McDonald writes new terms on the board. They know that Mr. McDonald will again ask them to complete a timed writing—this time they'll be able to use the new information he is sharing.

Mr. McDonald proceeds to add information about photosynthesis, heterotrophs, herbivores (plant eaters), carnivores (animal eaters), and omnivores (animal and plant eaters). As he documents ideas in note form on the board, providing real-world examples and information on the transfer of energy, he clarifies each new term. Students, in turn, capture bullet-point ideas in their notebooks. This routine is familiar to students. Mr. McDonald has modeled it and practiced it with them during other units of study. Now, the students are able to proficiently move through the activity of recording meaningful notes during a lecture for use later in their written and oral presentations.

Moving to Independence

Following this minilecture, Mr. McDonald offers a second writing prompt: "Explain the flow of energy as you move through the food chain. Use the following science terms: autotrophs, heterotrophs, photosynthesis, herbivore, carnivore, and omnivore."

A look at part of David's writing (figure 3.13) shows that he is growing in content understanding.

Energy can be moved from plants to animals. When a plant gets energy from the sun, it's making its own food. This is photosynthesis. Autotrophs is a word that means the organism makes its own food. Plants are autotrophs. Animals are heterotrophs. I think this is because they have to get energy from eating other things. Some animals eat plants, and some eat animals. The ones that eat plants are herbivores. The ones that eat animals are carnivores. Some animals eat both and are called omnivores. I am an omnivore because I like celery and hamburgers.

Figure 3.13: Student response to the writing prompt, Explain the flow of energy as you move through the food chain.

Mr. McDonald continues to add more information to his minilectures and periodically checks in with students by offering five-minute writing prompts. His goal is twofold. First, he wants to make sure that students are grasping and integrating the content into their already-established ideas about ecology. Second, he wants to monitor the students' progress in terms of science writing. He knows that as they move through the grades they will need to be able to take notes during a lecture. He wants them to be prepared.

As a reflective practitioner, Mr. McDonald knows that reading skills, oral language use (including listening and taking notes from the lecture), and writing go hand in hand. Since he also knows that it is the instructional practices of the teacher that can make the difference in student learning, Mr. McDonald diligently and frequently reviews work. Timed writings allow him to guide students as they learn content and as they integrate more and more science writing knowledge into their academic schema.

Questions for Discussion or Reflection

1. How might you use timed writing to support students' writing productivity? What types of assessment do you think would be appropriate?
2. How could you use the first in a series of timed writings to determine next steps for teaching?
3. Each time Mr. McDonald provided progressively deeper information, he asked students to incorporate the new knowledge into their writing. How would you support deepening knowledge acquisition about a science topic during timed writings?
4. Which grade-level NGSS and CCSS does your instruction address?

Timed writings require students to rapidly construct ideas in science. They also allow teachers to check in on a regular basis so that error patterns and misconceptions are caught early. The teacher then can begin to address areas of need.