



LIVING OR NONLIVING?

*First-grade lessons on life science
and classification address misconceptions.*

By Britt Legaspi and William Straits

I teach in a large urban area with a diverse student body. The diversity extends beyond ethnicities and languages to include a range of academic abilities and socioeconomic statuses. Once, a few years back, I asked my first-grade students the question “Is a rock a living thing?” To my surprise, several of them enthusiastically said, “Yes!” What seemed to be a simple enough question turned into more than just a teachable moment for me. It made me reevaluate the way I taught life science. During that moment, I struggled to keep

myself from telling them the scientific truth. Instead, I tried to offer queries to challenge their logic. The following are some of my questions and the answers given by one of my seven-year-old students:

Q. Why do you think a rock is alive?

A. Because it moves and drinks water.

Q. Have you ever seen it move?

A. No. But, I know it moves because at recess it’s in

one place and when I come back after lunch, it's in a different place.

Q. Have you ever seen it drink water?

A. No. But, after it rains there is a puddle under it. The puddle, it disappears because it drank it.

Q. Well, how does it drink it?

A. It sucks it up like a sponge.

Q. Do rocks have babies?

A. Yes, that's why we have little rocks.

He was certain that a rock was living because all of his personal experiences thus far had taught him so. Although I have been teaching primary grade students for several years, I had never before given addressing alternate conceptions any serious thought. This incident prompted me to develop a series of lessons to help students practice their observation skills, ask questions, and articulate their own reasoning to others. In this article, I describe these lessons.

Asking the Right Questions

Categorizing organisms as living or nonliving things may seem to be intuitive by nature. Yet, it is regulated by scientific criteria. The following are five of the most common scientific criteria used to define living things:

- Ability to use energy;
- Ability to reproduce (babies or seeds);
- Ability to interact with its environment (external and internal);
- Has cellular organization (single or multiple); and,
- Ability to make waste products.

However, memorizing a list of scientific criteria does not make as lasting an impression as exploration can, especially for primary age children (grades K–2). In fact, at this early stage in their schooling, students' conceptual understanding has been shaped primarily by their personal and cultural experiences. Keeping this in mind, educators have some critical questions to ask themselves:

- What do our students come to school already knowing about living or nonliving things?
- What has influenced students' reasoning for believing whether something is living or nonliving?
- What might be developmentally appropriate responses and outcomes during related discussions or activities?



Looking for living, nonliving, and dead things.

Just a Little Background

Students come to school with rules already in place. Their categorizing criteria have already been influenced by their personal experiences, also known as observations and inferences. Their intuitive sense has been coded by the observations and inferences gathered from their home culture (Caravita and Flachetti 2005). Jean Piaget's identified stages of cognition are well known to educators and psychologists. His *Pre-Operational Stage* (2–7 years) is when children tend to see only their own point of view. They believe that all things are alive in some way or another—either it can move on its own, have feelings, or can think for itself. Piaget's *Concrete Operational* stage (7–11 years) is when young students use their experiences as a guide to how the world around them works (Bosak 1991). They can understand and develop rules. They also have the ability to think about and recognize that relationships exist between things. It is during the primary years that teachers help children to transition from the preoperational to the concrete operational stage.

Inspired by the conversations that I have had with my students, I developed a series of lessons to address the topic of living versus nonliving. In building these lessons, I maintained an awareness of the effect of their own cultural influences and developmentally appropriate responses for six- to seven-year-olds. The lessons I used in my classroom were designed to help my first-grade students develop their observational skills, their ability to articulate their own thinking to others, and the skill of asking themselves provocative questions.

Living, Nonliving, and Dead

Primary teachers are often asked to teach basic concepts about the characteristics of living things and life cycles. The National Science Education Standards charge us with helping students to delineate between living and nonliving things. However, in the course of my teaching, I have observed that my first-grade students expe-

**Figure 1.****Living vs. nonliving classification rubric.**

- 4** (Advanced—Exceptional foundations in conceptual understanding for this age level)
- All things are classified correctly
 - Reasons for classification are consistent in logic and may even include scientifically recognized criteria
 - Reasons are based on at least three criteria
- 3** (Proficient—Solid foundations in conceptual understanding to meet the standard)
- Most things were classified correctly
 - Reasons for classification are generally consistent in logic
 - Reasons are based on at least two criteria
- 2** (Almost Proficient—Some conceptual understanding but not enough to meet the standard)
- Some things were classified correctly
 - Reasons for classification are inconsistent in logic
 - Reasons are based on one criteria
- 1** (Not Proficient—Little or no conceptual understanding to meet the standard)
- Very few things were classified correctly
 - No reasons were given for classification
 - Reasons, if given, could not be based on any criteria according to the student

rienced difficulty when they came across dead things. How can it be related to *living* things and *life* cycles if it's *dead*? In seeing this difficulty, I decided during classification activities to add a separate category labeled *dead*. I found this to be a useful way to scaffold the categorizing of living and nonliving things for the first graders. As the discussions and lessons continued, the “dead” column became a point of discussion leading to the redefining of this category as “once living.” This distinction between living and dead is included in the activities described below.

Categorizing and Rationalizing

In Session 1, Part 1, my students practiced making an observation versus an inference. They stated observations and recorded them. Without prior discussion of the criteria for living, nonliving, and dead things, I assigned pairs to designated areas of our playground to find and

illustrate the following: a living, nonliving, and dead thing. Students were instructed not to handle things without teacher permission. Be sure to carefully examine the school grounds beforehand to identify and, if possible, remove any possible hazards (e.g., broken glass, poison ivy, unattended gardening tools).

Students were expected to give a rationale for classifying each item as a living, nonliving, or dead thing. They could jot down words, if they were able to write. Ultimately, they had to explain their reasons to a partner and to the class.

English Learner Tip: Elicit a word bank of objects that can be found on the playground from the students prior to sending them out with paper and pencil (adding simple illustrations next to the corresponding words add clarity). When pairing students, place stronger English speakers strategically with those still acquiring the language.

For Part 2, the item name and rationales from Part 1 were written under the corresponding class-generated list: living, nonliving, or dead. I then led a whole-group discussion on finding the commonalities amongst all the rationales. It was helpful to circle like terms in one color and other terms in a different color. This made it easier to identify or isolate commonalities for discussion. I asked whether anyone would like to move any of the listed things to a different category. It was helpful to use sticky notes for this purpose. Some common elements stated by my students were *growth*, *ability to move*, *ability to think*, *ability to breathe*, *being made of metal*, *ability to grow seeds*, and *able to be killed*.

English Learner Tip: Though it added length to the discussion components, allowing students to participate in *pair-share*, a purposeful conversation between students in which dialogue may be directed for modeling correct grammar, gave them time to practice responses before sharing them with the whole class.

Discussing Criteria

In Session 2, Part 1, the class reviewed the categories and the commonalities in each of the three categories. We created a class set of criteria for living, nonliving, and dead things that reflected a few of the same items that are currently scientifically accepted (e.g., *eating*, *use of energy for living things*). The students evaluated and criticized reasons for their classification of things. During this session, my students were in a heated debate with me determining the difference between nonliving and dead things. They determined that both things did not breathe, did not have babies, and could not eat or drink. Just as we were at an impasse with reasoning, my wiggly and most inattentive student looked up. He cautiously raised his hand and said, “Um, the stuff that is dead was really once alive and the other stuff was never alive at all.” Wow! He had made the connection that the others couldn't quite



PHOTOGRAPHS COURTESY OF THE AUTHORS

A student illustrates what he's found.

articulate! At this point, discussion followed with regard to changing the category title “dead” to “once living.”

For Part 2, we reviewed the class-generated set of criteria. Next, I asked the following questions: *Where would you place _____ based upon these common criteria we have come up with? Why would you place _____ in that category? (rocks, bones, cars, eggs, and acorns)* I had students consult a pair-share partner for each item. I walked around asking guiding questions like: *Is it alive? Is it living? Does it fit the criteria?*

English Learner Tip: If available, teacher should provide actual objects as visual aides (e.g., a real rock, replicas of bones, model cars, acorns).

Journal Reflections

In Session 3, we wrapped up our lesson with a discussion of observations recorded in journals. We also compared the rocks to humans using a chart. At the end of the discussion, we reviewed the pictures from session 1. I asked students whether there were any changes they wanted to make to the list of criteria or move any pictures to other categories. I also asked whether any of the students would keep “rock” in the same category or move it to a

different one. I allowed time for pairs to share their thoughts; this contributed to a more fruitful whole-group discussion.

Evaluation

I used a rubric (Figure 1, p. 29) to determine the level of students’ conceptual understanding as part of Session 2, Part 2. My final assessment was to re-administer the classification activity from Session 1 and compare it to their initial classification skills. I allowed them to make observations for each category. First, they had to classify their original items and reclassify any or all of them. Second, they went back to the playground to find one new item to add for each category. They also had to make a list of reasons for their classifications. I took an overall look at the students’ charts for growth in their conceptual understanding and for their level of developmental readiness.

As a result of the instructional plan, I found that most of the students (16 of 21) were using the key vocabulary (*living, nonliving, and dead*) correctly in both oral and written responses. For example, the students were able to explain that *living* things are those things that have needs (e.g., water and food). Most of the students stated that *soil* was something living things might need or that the ground (dirt) belonged under the list of dead things. Soil is a tricky item because it may consist of living, nonliving, and dead matter. This indicated to me that we needed to further explore the plant cycle and the role that soil plays as part of that cycle. Another example is that most students were able to state that *dead* things were once alive but not anymore. They stated that dead things didn’t move or eat anymore. In my personal research of the topic, I found that movement is a common element for children (nine months to nine years old) and many adults as criteria for classifying something as living (Caravita and Falchetti 2005; DiYanni and Kelemen 2004).

Technology Tips

The lessons described previously can be easily infused with information technology. In lieu of illustrations, students can use digital cameras, camcorders, or document cameras. The digital cameras allow students to



PHOTOGRAPHS COURTESY OF THE AUTHORS

“Hmm, how do we categorize this?”

compare their factual observations with the images taken. The images can be put into a slideshow and each student can share his or her thoughts. Teachers may want to create their own slideshow of images collected from the internet, clip art, or other resources. During your slideshow, you can ask the same guiding questions from Session 2, Part 2. Particularly useful is the ability to show multiple images on a single slide. The students can then compare and contrast those images. They are also a nice alternative for students who have trouble with the fine motor skills involved in drawing but are capable of clicking a button on the camera. Camcorders can record thought process and reasoning as students wander around the playground. The document cameras offer the option of bringing things into the classroom to view much like a microscope. Some document cameras may offer a split screen on which students can compare or contrast two images simultaneously. All of these choices will require a projection unit, like an LCD projector or a television, for use with the entire class. Alternatively, a low-tech, low-cost version may be to print out the pictures and post them.

Final Thoughts

Opportunities for developing students' awareness of life as a series of interrelated processes need to continue beyond the primary grades. Teachers can provide a “push” or allow for the opportunity for students' conceptions to be challenged. This was just the case with my most wiggly and inattentive student who was able to make the distinction between nonliving and dead things

during Session 2. Even though young children may not be developmentally ready to deal with challenging their intuitive senses, asking the right kind of questions and giving students multiple opportunities to challenge their thinking is still important. And, when the students are ready, then their experiences will provide a stronger conceptual foundation for them to build on as they move through their academic careers. ■

Britt Legaspi (blegaspi@lausd.net) is a primary grade teacher at Eagle Rock Elementary School in Los Angeles, California. William Straits (wstraits@csulb.edu) is an associate professor of Science Education at California State University, Long Beach, in Long Beach, California.

Internet Resource

Essential Science for Teachers: Life Science
www.learner.org/resources/series179.html

References

- Bozak, S.V. 1991. *Science is...: A source book of fascinating facts, projects and activities*. Ontario, Canada: Scholastic Canada.
- Caravita, S., and E. Flachetti. 2005. Are bones alive? *Journal of Biological Education* 39 (4): 163–170.
- DiYanni, C., and D. Kelemen. 2004. Time to get a new mountain? The role of function in children's conceptions of natural kinds. *Cognition* 97: 327–335.

Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards

Grades K–4

Standard A: Science as Inquiry

- Abilities necessary to do science inquiry
- Understanding about science inquiry

Standard C: Life Science

- Characteristics of organisms

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academies Press.