

## Mrs. Sanders's Fourth-Grade Class

Lois Sanders has always been well prepared to support students who struggle with science language. She understands that Selena, a newcomer to the United States, is not only tackling new content words but also trying to master English. Spanish is Selena's first language, which she speaks fluently. The language demands on Selena can, at times, seem a bit overwhelming. To help mediate this situation, Mrs. Sanders often has her students work in small groups or with partners. She knows that peer grouping and collaborative work help foster content conversations that are conducted in safe, friendly learning environments. To further ensure this, Mrs. Sanders strategically organizes her groups so that English learners and struggling students can work with supportive peers, some of whom have a greater mastery of the language. On other occasions, she'll challenge those students who easily acquire the science and academic language by adding more complex content information through text, media, or both. She also ensures that she is addressing the NGSS crosscutting concepts related to systems and system models and structure and function. Table 2.7 (page 2) shows Mrs. Sanders's lesson plan.

While introducing her students to the scientific concept of systems and system models and structure and function, Mrs. Sanders engages them in many collaborative activities as a way to support their communicating like scientists.

### Thinking Aloud to Model How to Clarify Information

Mrs. Sanders brings in her model of a heart to study the circulatory system. She shares her thoughts about the different parts of the model:

I see that this heart model has several labels with many new words: left atrium, right atrium, right ventricle, left ventricle, superior vena cava, inferior vena cava, pulmonary veins, and aorta. These must be names for the parts of the heart that have these labels. I'm going to look at HowStuffWorks.com to see if I can figure out what these parts of the heart actually do.

Mrs. Sanders's modeling intentionally shows students how she seeks out clarifying information in order to mediate gaps in knowledge. She wants her students to become proactive learners who look for ways they can help themselves to understand challenging content.

After thinking aloud about the heart model, Mrs. Sanders visits the HowStuffWorks website (<http://science.howstuffworks.com>) and reads an article about how the human heart works (Bianco, n.d.). She again thinks aloud about the content she is reading:

I see the same labels on the heart image on this website as I do on the model I have here in the classroom. I see here that it says the heart is a muscle. I know that I use muscles in my arm when I lift objects, like my backpack. My muscles can do work. I wonder if the heart also does work? Maybe it works for the rest of my body. That would be my prediction.

As she continues to think aloud while reading the article, Mrs. Sanders makes connections to previous readings and to her own background knowledge. She purposefully uses appropriate academic and technical vocabulary so students will become a bit more familiar with terms like muscle and prediction. After reviewing the website, Mrs. Sanders revisits the heart model. She reviews the parts

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**Table 2.7:** Fourth-Grade CCSS for Speaking and Listening and Language and NGSS Lesson Plan on Earth and Space Sciences

Crosscutting Concept	Earth's systems
Core Idea	The roles of water in Earth's surface processes
Lesson Purpose	Understand and discuss how the processes of weathering and erosion affect the surface of the Earth
Focus Strategy	<p>Chunking texts to support science reading and using discussion webs to streamline information sharing</p> <p>Thinking aloud to model how to read and think about information in the text</p>
<p><b>NGSS</b></p> <p>4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p> <p>3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.</p>	
<p><b>CCSS</b></p> <ul style="list-style-type: none"> <li>• Speaking and Listening standards: <ul style="list-style-type: none"> <li>SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 4 topics and texts</i>, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> <li>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.</li> <li>b. Follow agreed-on rules for discussions and carry out assigned roles.</li> <li>c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.</li> <li>d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.</li> </ul> </li> <li>SL.4.2. Paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.</li> <li>SL.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Language standards: <ul style="list-style-type: none"> <li>L.4.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.</li> <li>L.4.3. Use knowledge of language and its conventions when writing, speaking, reading, or listening.</li> <li>L.4.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of being (such as <i>quizzed</i>, <i>whined</i>, <i>stammered</i>) and those that are basic to a particular topic (such as <i>wildlife</i>, <i>conservation</i>, and <i>endangered</i> when discussing animal preservation).</li> </ul> </li> </ul>	

Source: Adapted from NGA & CCSSO, 2010a, pp. 24, 28, 29, and Achieve, 2013a pp. 23, 26, 32.

of the heart by integrating her newly acquired content knowledge. Next, Mrs. Sanders turns the conversation over to the students using a protocol for student talk—inside/outside circles.

## Conversing to Practice Language and Clarify Understanding

Mrs. Sanders often uses inside/outside circles (Kagan, 1994) as an instructional routine to get students out of their seats and positioned so that everyone must talk. This works well, because everyone gets an opportunity to share his or her thinking. To form inside/outside circles, Mrs. Sanders asks half her class to create an inner circle in which all students are facing outward. The other half of the class create an outer circle in which all students are facing inward.

Ultimately, each student faces a partner with whom he or she will have a conversation. Sometimes, Mrs. Sanders strategically places English learners or struggling students with a more fluent partner. Other times, she partners students who speak the same native language. Her partnerships depend on the goals of the lesson. For the heart discussion, Mrs. Sanders gives all students a handout with a labeled diagram of the human heart (figure 2.12). She then asks her inside students to talk for two minutes to their outside partners about the parts of the heart. Mrs. Sanders monitors conversations and occasionally intervenes when needed. When she hears Mario tell his partner, Michael, that the heart has two valves, she suggests Mario review his handout—a cue that directs Mario’s attention to an image showing four valves—the tricuspid valve, pulmonary valve, mitral valve, and aortic valve.

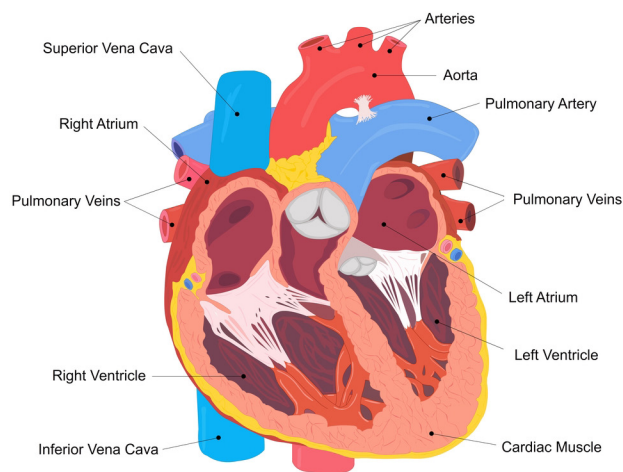


Figure 2.12: Model of a human heart.

Mario immediately corrects himself and confidently revises his statement by saying, “I know that there are four valves in the heart.”

After the inside partners finish sharing, Mrs. Sanders asks the outside students to talk about how the heart pumps blood. Students flip over their heart diagram handouts to reference a flow-chart (figure 2.13, page 5) that provides technical vocabulary terms, like pump, chambers, atrium, and ventricle. There are also academic terms and phrases, including as, while the, eventually, and

because of this. The outside students use these terms to create responses to Mrs. Sanders's prompt, "How does the heart pump blood?"

After students finish their conversations, Mrs. Sanders asks the students on the inside to rotate one place to the left. She then asks the outside students to talk for two minutes about the parts of the heart using the labeled heart diagram. Following this, the inside students use the flowchart to share with their partners how the heart pumps blood. All students have a chance to talk about the content and to listen to their partners use the targeted science words and academic language. The labeled heart diagram and the flowchart provide scaffolds that students can use easily as they wrestle with new content and new words. Mrs. Sanders is able to listen in and determine who needs more guidance and who might benefit from opportunities to go deeper with content. In essence, she is able to monitor progress and make informed decisions about next steps in terms of the lesson.

### Questions for Discussion or Reflection

1. As Mrs. Sanders scrutinized the heart model, she very intentionally showed her students how to think about sources other than print to build a base of knowledge. This practice is very essential when teaching science. What materials other than models are students required to analyze in order to understand scientific information? Select one, and with a colleague practice thinking aloud as you analyze its features.
2. Mrs. Sanders had students reference a diagram as they talk to their partners in the inside/outside circles activity. What prompts or questions might you offer to students to have them talk about science content?
3. What other ways would you support English learners as they try to acquire science language in addition to the English language?
4. Which grade-level NGSS and CCSS does your instruction address?

In science, students need to see, hear, and speak about technical vocabulary in order to internalize and own the words as a part of their working vocabulary. Many science words have meaning that goes beyond a mere definition. In the case of a study of the heart, students need to understand that the terms represent parts of the heart and specific roles or functions. Engaging in discussions that require accurate use of new words is vital to developing comprehension. Because science content is often very complex and heavily laden with technical terms, the provision of resources like the heart flowchart can help facilitate accurate use of words.

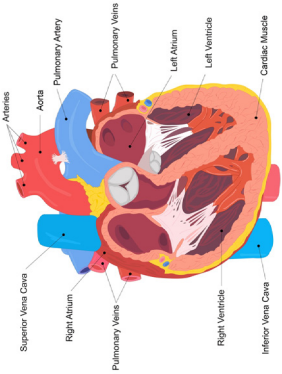
Heart	Atria	Ventricles	The Process	Valves	Blood Vessels	Circulation
 <p>The heart pumps blood around the body.</p>	<p>There are two atria—the left atrium and the right atrium—which are chambers that fill with the blood returning to the heart from the body and lungs.</p>	<p>The heart has a left ventricle and a right ventricle. Their job is to push the blood out to the body and lungs.</p>	<p>While the atria fill with blood that gets pushed into the ventricles, the ventricles push blood out through valves. Blood reaches all parts of the body through this process.</p>	<p>The heart valves direct the blood that is pushed out of the ventricles. Eventually, blood gets to all parts of the body.</p>	<p>Blood travels through tubes attached to the heart called vessels. The vessels that carry blood away from the heart are called arteries. The ones that carry blood back to the heart are called veins.</p>	<p>As blood moves to all parts of the body, it carries oxygen to all cells.</p>

Figure 2.13: Sample flowchart for inside/outside circles.