



The Art of Argumentation

Fourth graders practice with language frames to learn the process of argumentation in inquiry-based instruction.

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Children are often good at arguing, but not argumentation. We are reminded of a recent classroom exchange between students studying sunlight and shadows. One of the students working in a group said, “There are no shadows at night.” Another said, “There are too.” The first retorted, “uh-huh” and the second confirmed, “na-uh.” They continued their argument, without adding any information, clarifying concepts, or requesting justification. In other words, they argued, but this interaction did not result in increased understanding. They did not practice the art of argumentation. Like other skills and strategies, students have to be taught how to engage in argumentation.

Argumentation in science involves offering and responding to claims, providing and asking for evidence or justifications, and analyzing those claims to formulate a decision (Gross

1990). Our experience with students, including those who are English learners, suggests that many young science students benefit from language frames to scaffold the use of academic language and vocabulary to formulate arguments and counterclaims.

Language frames are effective tools, but students require teacher modeling of these tools to build their capacity for holding meaningful discussions. In this article, we describe how modeling can take shape in the classroom.

Framing the Argument

Language frames are partially constructed cloze statements that highlight the academic language and syntax

required to communicate in argumentation. They provide students practice in the discourse patterns expected of educated citizens. For example, a simple language frame for providing evidence is “I know that ____ is ____ because ____.” A frame useful in requesting evidence is “How did you know that ____ was ____?” A frame useful in offering a counterpoint is “My idea is because I read ____.”

Frames can be hard to find; Figure 1 lists several examples. Graff and Birkenstein (2006) recommend the use of frames (they call them *templates*) as an effective way for developing students’ thinking and academic writing skills. They also provide examples in their book.

Figure 1.

Language frames for argumentation in science.

Making a claim	I observed _____ when _____. I compared _____ and _____. I noticed _____, when _____. The effect of _____ on _____ is _____.
Providing evidence	The evidence I use to support _____ is _____. I believe _____ (statement) because _____ (justification). I know that _____ is _____ because _____. Based on _____, I think _____. Based upon _____, my hypothesis is _____.
Asking for evidence	I have a question about _____. Does _____ have more _____? What causes _____ to _____? Can you show me where you found the information about _____?
Offering a counterclaim	I disagree with _____ because _____. The reason I believe _____ is _____. The facts that support my idea are _____. In my opinion _____. One difference between my idea and yours is _____.
Inviting speculation	I wonder what would happen if _____. I have a question about _____. Let’s find out how we can test these samples for _____. We want to test _____ to find out if _____. If I change _____, (variable in experiment) then I think _____ will happen, because _____. I wonder why _____? What caused _____? How would this be different if _____? What do you think will happen if _____ / next?
Reaching consensus	I agree with _____ because _____. How would this be different if _____? We all have the same idea about _____.

Frames are displayed as a poster and on table tents, in addition to being frequently modeled by the teacher.

Based on our classroom experiences, language frames provide students an opportunity to consolidate their understanding of specialized and technical terms as they use them to share their thinking. We have used frames in K–12 classrooms, and Graff and Birkenstein (2006) even used them in college teaching, simply changing the complexity of the frame.

Modeling Argumentation

Fourth-grade teacher Karen Jessop employs language frames to foster argumentation, and she actively models their use. Rather than telling students to use the frames, Ms. Jessop thinks aloud using the frame. She incorporates “I” statements into her modeling and provides students with examples of the cognitive processes she uses to understand the content.

Some students in Ms. Jessop’s class bought hermit crabs as pets, causing them to discuss the crabs’ care and feeding with one another. Hearing the ongoing debates among students, she thought this would be a good opportunity to hone her students’ use of argumentation by capitalizing on their inquiry and addressing a California content standard (students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all). Some students had told her about difficulties their hermit crabs were having, so she formulated a question for her students to explore: What environmental conditions can reduce the stress of hermit crabs?

Ms. Jessop modeled the use of language frames as she read aloud about hermit crabs. For example, given that the class was focused on creating a suitable living environment for the crabs, she paused after reading about crabs’ legs falling off. She gestured to the language frame poster in the class (Making a claim, Figure 1, p. 29) and said, “Oh, now I think that this is important. The effect of environmental stress on hermit crabs is their legs and claws can fall off. I have to read more to find out about an appropriate environment as I don’t want to cause them stress and loss of limbs.”

Later in the reading, Ms. Jessop noted one of the conditions that reduced the stress hermit crabs experience. Again, pointing to the language frame (Providing evidence, Figure 1), she said, “I believe hermit crabs need to have wet sponges in their enclosures because they require a higher humidity than our climate has.”

Learning Requires Interaction

Although our experience suggests that teacher modeling is critical to student learning, we also recognize that simply listening to the teacher will not result in full understanding. To ensure that students develop an under-

standing of argumentation, they need to practice with their peers. Consider the following exchange between a group of students and notice their use of language frames for argumentation:

“I have a question about the right food for the crabs. I noticed that my article says that they are omnivores.” (Asking for evidence.)

“I disagree because mine only eats plants. Can you show me where you found that?” (Offering a counterclaim.)

“I know that hermit crabs are omnivores because mine eat fruit and sometimes shrimp.” (Providing evidence.)


“Shrimp? I disagree because the hermit crabs probably couldn’t get shrimp in real life.” (Offering a counterclaim.)

“The facts that support my idea are my experience and reading.” (Offering a counterclaim.)

“We all agree they eat fruits and vegetables, I mean plants, right?” (Reaching consensus.)

“Let’s try to find more evidence of what they eat, specifically examples of them being carnivores in nature.” (Inviting speculation.)

Although these conversations are important, students must also have opportunities to consolidate their understanding and apply knowledge through productive group work. In Ms. Jessop’s classroom, students were provided with reading material about hermit crabs. In groups, they developed a list of recommendations for the appropriate



*Let's try to
find evidence
to support
that claim.*

care and handling of these animals. Their product was an informational brochure in which they made recommendations. We used these brochures as a portion of the assessment for student understanding. Although the outcome was important, the process was critical. Students used this task as an opportunity to practice argumentation using the language frames that had been modeled for them. Consider the following quotations from different students in the class:

- One difference between my idea and yours is about heat lamps. My idea is to have lamps that look like rocks so they aren't scared of them.
- I wonder what would happen if they had too much water? I believe that they would be stressed because their habitats don't have lots of water.
- I agree that we should recommend a sand floor because the crabs like to dig and hide.

These comments demonstrate the power of teacher modeling and language frames. As part of their inquiry, students in the classroom were learning argumentation. They interacted with their peers using academic language to consider a question that they cared about. They used print resources to find answers, debate ideas, ask questions, and reach conclusions. More important, there was not a simple and obviously correct answer to the question under investigation.

Ms. Jessop deliberately used language frames. In addition to modeling their use, she posted them on the wall. She used them throughout the day, not just in science. When they encountered similarly constructed language in other texts, they discussed why the author might use this rhetoric to explain, justify, or agree. She also provided support for her students during their small group discussions. She made table tents of the language frames so that each group would have them in plain sight. As she sat in on discussions, she listened for the use of argumentation language frames and noted which students were more adept at using them. At times, she prompted their use for students who applied them infrequently, noting for them that, "this is how scientists figure out ideas."

Arguing Is a Necessity

As Maloney and Simon (2006) noted, argumentation is a necessary component of inquiry. They explained that children "need to become aware of the tentative status of some scientific knowledge so that they are better able to cope with uncertainty when they have to make choices and decisions" (p. 1818). They studied the argumentation discourse of 10- and 11-year-old students analyzing data from life and physical sciences. The researchers found that although the most

Connecting to the Standards

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

Content Standards

Grades 5–8

Standard A: Science as Inquiry

- Abilities necessary to do scientific inquiry

Grades K–4

Standard C: Life Science

- Organisms and environments

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

sophisticated learners could explain their thinking, request justifications from others, and recast their position based on knowledge learned from others, many other students could not. The children who were less effective at argumentation formulated their decisions before the discussion began, rarely asked for evidence, and used data selectively. The researchers suggested that teachers help students move beyond turn-taking to foster critical discussion skills, to move beyond "uh-ha" and "na-uh" exchanges. For this change to occur, students will need models and practice with the language of argumentation.

Scientific thought isn't built by merely cooperating with one another—students must collaborate to reach a deeper understanding of concepts (Frey, Fisher, and Everlove 2009). Language frames provide an effective scaffold for bridging the divide between teacher modeling and group discussion. ■

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