Formative Assessment Vignettes

Activity 1.7

In this activity you are given a choice of vignettes to read. We provide choice so that the content area or grade level is more closely aligned with what you teach. Please read as many vignettes as you wish or have time for. Each vignette gives a different perspective on the ways that formative assessment practice may manifest in the classroom. As you read, you may wish to jot notes in the margins, highlighting what you notice about the formative assessment strategies in these examples.

- Vignette 1 – Elementary Mathematics Lesson on Representations of Multiplication
- Vignette 2 – Elementary Physical Education Lesson on Dance
- Vignette 3 – Middle School Science Lesson on the Digestive System
- Vignette 4 – High School Language Arts Lesson on Characterization
- Vignette 5 – High School Science Lesson on Voltage and Current

Vignette 1: Elementary Mathematics Lesson on Representations of Multiplication

Mr. Harris' third grade class is responsible for setting up the chairs for the spring band concert. In preparation, they have determined the total number of chairs that will be needed and asked the school's custodian to retrieve that many chairs from the central storage area. Now, they will analyze a problem situation (about the arrangement of chairs in the auditorium) that Mr. Harris has designed around the following Learning Goal and Success Criteria.

Learning Goal: Students will understand how the structure of multiplication is evident within and among different representations.

Success Criteria:

- Students will use different representations to represent the same multiplication problem.
- Students will provide a correct and mathematically precise explanation of how both terms of a product are reflected in visual representations of that product.

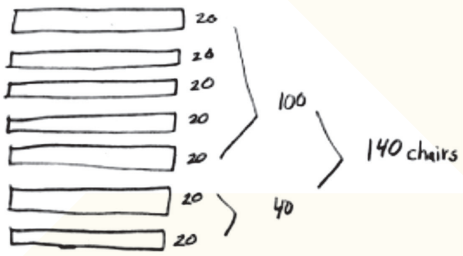
Mr. Harris explains to his students that they need to set up 7 rows of chairs with 20 chairs in each row, leaving space for a center aisle. Next he asks the students to consider how they might represent the problem: "Before you begin working on the task, think about a representation you might want to use and why, and then turn and share your ideas with a partner." As students discuss how they will solve the task with their peers, Mr. Harris circulates and makes a note of the vocabulary students are using to discuss their representations. He notices that most students have a strategy for starting the task, but many are having trouble describing their strategy in a precise way.

The students set to work on the task. Most sketch equal groups or decompose area models. Two students cut an array out of grid paper. A few students make a table or T-chart, listing the number of rows with the corresponding number of chairs. Some students use symbolic approaches, such as repeated addition or partial products.

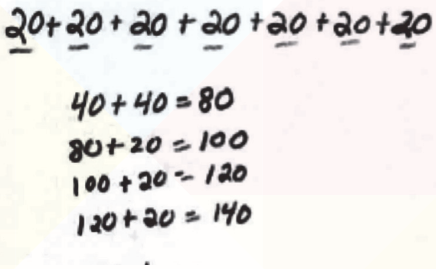
A few students change representations as they work. Dominique starts to draw tally marks but then switches to using a table. When Mr. Harris asks her why, she explains that she got tired of making all those marks. Similarly, Jamal starts to build an array with connecting cubes but then switches to drawing an array. Mr. Harris knows that these initial attempts are valuable, if not essential, in helping each of his students make sense of the situation. He uses these mini-discussions to push students towards precise mathematical vocabulary, and when they are unable to recall the correct term for the representations they are working with, he directs them back to their math journals where they review their notes.

As the students work, the teacher poses purposeful questions to press them to consider critical features of their representations: "How does your drawing show 7 groups?" "Why are you adding all those twenties?" "How many twenties are you adding, and why?" Student answers to these questions help Mr. Harris decide which issues will need to be a central focus of the whole-class discussion.

Before holding the whole-class discussion, Mr. Harris has the students find a classmate who used a different representation. He directs them to take turns explaining and comparing their work and solutions, and reminds them to hold their peers accountable for precise mathematical vocabulary. During this partner work, Jasmine, who drew the diagram shown below on the left, compares her work with Kenneth, who used equations, as shown on the right. Then Mr. Harris has the students repeat the process, finding another classmate and holding another share-and-compare session.



Jasmine's representation



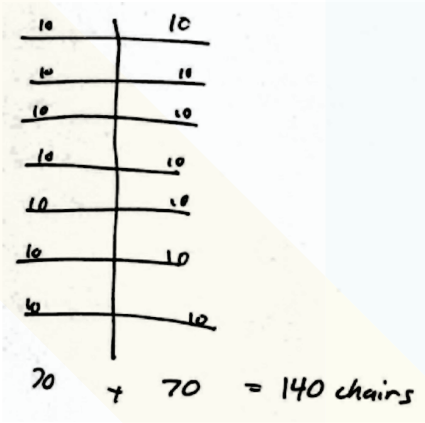
Kenneth's representation

Mr. Harris has intentionally waited until this point in the lesson to share the Learning Goal and Success Criteria with students. He knows that ideas like "the structure of multiplication" and "different representations" are somewhat abstract. Without some concrete examples to use as reference points, his students would struggle with this academic language. To give the class these reference points, he has let them get into the work and discuss it so that now, as he shares the Learning Goal and Success Criteria, students have a clear understanding of what they should know and be able to do by the end of the lesson. They are also comfortable using academic vocabulary to talk about their Learning Goals.

Mr. Harris begins the whole-class discussion by asking students to identify and explain how different visual representations show both the number of equal groups and the amount in each group as a structure of multiplication. This prompts the students to compare different representations, and Mr. Harris notes that nearly all students are now using the correct vocabulary ("diagrams," "equal groups," "arrays," "area models," etc.) as they discuss how they are similar and different. The students comment that it is easy to see the number of chairs in each row in some of the diagrams but not in others. Mr. Harris then writes 7 × 20 on the board and asks the students to explain how the expression matches each of the diagrams.

Student explanations provide a valuable window into their thinking about the relationship between the terms of a product and the visual representation of that product. For example, Mr. Harris notices that a handful of students are still struggling to differentiate between "the number of equal groups" and "the amount in each group." He will use this information to plan tomorrow's lesson, during which he will work with these students on this specific issue while others do more advanced work.

Finally, Mr. Harris has the students discuss and compare the representations of those students who considered the aisle and worked with tens rather than with twenties, such as Amanda, whose work is shown below. He asks them to take this final step, knowing that this informal experience and discussion of the distributive property will be important in subsequent lessons.



Amanda's work with tens

This vignette adapted from National Council of Teachers of Mathematics, Principles to Actions. http://www.nctm.org/PtA/

Vignette 2: Elementary Physical Education Lesson on Dance

In her upcoming P.E. lesson, which is part of a larger dance unit, fifth grade teacher Ms. Norton is using the following Success Criteria to check her students' learning. She wants to know specifically if her students can:

(1) Identify specific ways to improve the dance technique they each have been practicing;

(2) Notice any trends in how the dance is performed by the whole class and how it can be improved; and

(3) Be able to practice the dance with a greater awareness of their own body movement with specific positions.

To get ready for this lesson, the students have been working for several weeks on learning to perform individual movements, to combine them into a choreographed dance routine, and interact in coordination with one another throughout the choreography. Ms. Norton believes that the reflective process of the upcoming lesson will lead to an improvement in her students' execution of the dance elements they have been learning and in their overall understanding of how their own movements are actually expressed in dance. She plans to conduct iterative reflective practices over the course of the lesson, culminating in peer assessed in-class performances of the dance routine.

Today's activities start by Ms. Norton and her students reviewing a video segment of their whole class practicing the dance warm-up, shot the previous day. As the students sit down cross-legged on the floor in front to the monitor, Ms. Norton says, "Now I think it is going to be interesting for us to have a little look at these performances."

The class begins viewing the video together, and Ms. Norton draws their attention to certain aspects of their dance movements she would like them to consider. Pointing to the screen, she says, "Your feet, what about your feet?" The students murmur various comments.

Ms. Norton says, "Yes, we have some turning out. Turning out is a lovely position but we are looking for parallel." Then she points at her own image and remarks, "Look at my toes and now look at your toes." The students giggle and the teacher resumes playing the video which had been paused. "And what about these slides?" The teacher and students slide across the floor in the video with repeating, stretched out leg movements. "I think these are the smallest slides I have seen you do!" The students and the teacher all chuckle good-heartedly when they notice their mistakes in the playback of their dance practice.

Ms. Norton very much wants the students to see themselves dancing instead of just hearing feedback from her because, as she remarks, "They all have in their minds what they think they are doing. Then they watch themselves and see for themselves that maybe their back leg was not as straight

as they thought it was, or they are not stepping as big as they thought they were, or they are not concentrating, or their focus is down. So they can actually see that for themselves."

After reviewing the video, Ms. Norton asks the class, "What do you think your slides need to have a bit more of?"

"Use more space," replies one student.

"You need to use more space?" she asks.

"At extension," clarifies the students.

"Yes, using more extension in your slides," confirms Ms. Norton. "Do you think everybody needs to do that?"

"Yeah," they all concur.

"What else does everyone need to do?"

"We have got to jump higher when we do the spinny arm thing. We have got to jump higher a bit."

"I'm sorry, are you talking about the body swings?"

"Yeah, 'cause I jump like an inch off the ground there."

"So you need to jump higher. Do you think everyone needs to jump higher?" Ms. Norton asks.

All the students respond, "Yeah, we do."

"Ok, can we do it again then, right away?" asks Ms. Norton.

The students agree and get ready to practice their warm-up in front of the camera again, this time with a renewed sense of purpose. Ms. Norton calls out again, "Are we ready? Alright, three, two, one, slide and back!" and they all slide forward and step back, including Ms. Norton who is modeling the steps. "You are the biggest bunch of cheaters I have ever seen!" Ms. Norton calls out good humoredly when she sees the students taking small steps. "If you go back into that warm-up and do anything smaller than that, then you are a cheat. Let's start from the beginning. Are we ready cameramen?" They give her the thumbs up. "Here we go. Just once through." Music starts playing. "Ready? Five, six, seven, eight."

Students start dancing and Ms. Norton directs and models their sequence of choreographed steps, saying in time with the music, "Swing, step, step, stretch, over, down, up, over, down, up, slide, back, slide, turn, and stop!"

After finishing, all the students sit on the floor at the front of the room to watch their performance on the monitor. "Have a look, I think the performance today was better. Your focus is still down here," she says at one point. "This is really good extension here, really good," she remarks at another point. "Now look at the slides, tell me if they are better than the first time." The students discuss their performance for a while, reflecting on what worked and what did not.

Afterwards, one of the students remarks, "I think it is good when we watch it on the screen 'cause then you can see your mistakes and you know what to improve on." Another student adds, "I saw some stuff here that I realized I was a bit sloppy on." A third student pipes in, "When I'm actually doing it, it seems like I'm using all the space and extending my leg. But when I see it [the video], I can tell that I'm not doing it correct, and then I can correct myself next time."

Away from her class, Ms. Norton concedes that there are dangers in using peer assessment. "I have had lessons where students have been quite unconstructive with comments. Especially if there is a situation where there has just been an argument over lunch or there is a particular student who is being bullied by another member of the class. There are situations where you have to tread quite carefully. In general, you have to set it up beforehand and explain to them what constructive feedback is all about."

For the main activity of the lesson, students participate in small group choreographed dances that are evaluated by their peers who watch from the sides of the room, filling out assessment sheets on clipboards. Watching and responding to the warm-up gave the students a good idea of how to go about reviewing other's work and give feedback. In this main activity of the lesson, they are more systematic and analytic, using written feedback. In this peer review, "There are questions evaluating other students' dance, such as, are their legs extended, have they really improved their dance? So even though I'm giving them questions and I'm giving them prompting words, I'm also trying to get them to expand on what they are talking about. It is guiding them, but it is also getting them to think for themselves."

When they finish, Ms. Norton and the students have several sources of evidence to gauge the status of their learning, including both how they performed (as reviewed by themselves and others) and how well they were able to review others' performances. Student reviews show their understanding of the Learning Goals and Success Criteria, which were embedded in the assessment forms. At the conclusion of the lesson, Ms. Norton states, "It is nice that students are also learning how to look at other people and analyze movement. That is particularly important in dance. If they are looking at how to analyze somebody else's dance moves, they are more likely to be able to do that in their own performances."

Adapted from Teacher TV Video Archives

Vignette 3: Middle School Science Lesson on the Digestive System

Ms. Henner's sixth grade science class is at the midway point in a series of lessons focused on the human digestive system. The goal of the unit is for students to understand the system of digestion and is focused on the cross-cutting science concepts MS-LS1-3:

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

Prior to this lesson, students explored topics including nutrient absorption, specialized cellular structures, and, most recently, addressing the underlying concept of what organs, processes, and specific enzyme activities take place within the digestive "system."

In class the previous day, a group of students were grappling with this idea of how specialized systems work within the body, when they described the human digestive system as being like a "skin on the inside." These students described how the digestive system creates a barrier between the intake of external foods that could be harmful for the rest of the body systems. This led to a class discussion in which Ms. Henner identified that students were meeting two of the four Success Criteria related to understanding the structure and function of each element of the digestive system, as well as being able to describe aspects of the overall digestive system. However, during that dialogue students demonstrated misconceptions about how the subsystems operate; in particular, they showed a lack of knowledge about the enzymes and other mechanisms that support each element or subsystem within the digestive pathway.

Based on this information, Ms. Henner develops a mini-lesson for the following day on enzyme functions, with her goal being that students will not only be able to name enzymes, but understand their specialized role in digestion. As class begins the next day, the teacher asks students to take out their science notebook and review the Success Criteria. After a discussion with their learning partners, students self-assess that they need further work on the following:

- Identify and describe the role enzymes play in each aspect of the digestive system; and
- Describe the inter-relationships of specialized subsystems within the human digestion system.

For the mini-lesson, Ms. Henner developed a concept map activity that will be administered in two parts. In the first segment, students will work in trios on the organization of the concept map. In the second segment, students will work on their own to describe the relationship between elements of the concept map. While students develop their concept maps, the teacher will collect evidence of student understanding of the role of enzymes in digestion and in their ability to understand the digestive subsystems.

Ms. Henner structures the concept map Learning Experience carefully so that each student participates in academic dialogue. Working in their groups of three, each student draws a card in turn and places it on the map. As each card is placed on the table, the student defines that element and describes its role in the digestive system. Peers must agree that the card is in the right place.

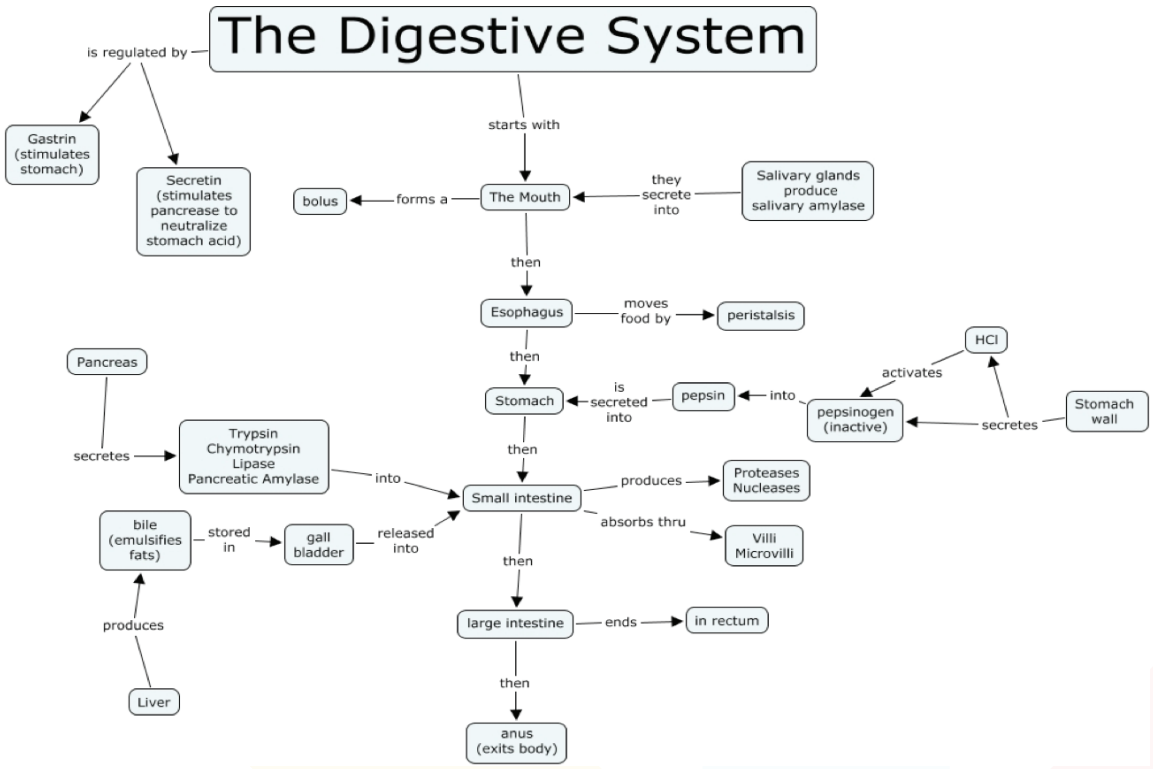


Figure 1: Example of completed concept map.

Since every student is responsible for some of the cards and errors need to be corrected, Ms. Henner listens for any areas where there is confusion or disagreement. She jots a few notes as she does this so that she can remember these ideas later. For the most part, students are able to resolve differences and persuade each other of any changes in the placement of elements. At one point, when she notices some errors that two of the trios have, she asks one student from each of those groups to walk around the room and see if there are differences at other tables. These students report back to their trios and then work together to resolve those issues. At the close of the small group work, all students had correctly placed elements in their concept map. This confirmed the teacher's observations of the previous day, that students were largely able to understand how the "whole system" of digestion worked. However, as Ms. Henner listened to student dialogue, she observed that while students could name functions, students still had a limited grasp of how the different subsystems functioned. She will pay close attention to this as she reviews student work and plans for the next few lessons.

During the second phase of concept mapping, students work individually to describe each of the "connectors" on the concept map. The connectors show if students understand the processes within each specialized subsystem of the overall digestive system. Students have time in class to complete this Learning Task, and they can ask questions of peers or the teacher during this time. Students complete their analyses of connectors in their science notebook and turn these in as they leave class. During her prep period later that day, Ms. Henner writes individual feedback in each student's science notebook.

> *Madison:*
>
> *From our class work and from your definitions page, you are now using significant detail to describe each organ function. The connections on your concept map show me that you understand the sequence of organs and how each organ process feeds into the next as food travels through the digestive system. In addition, you have asked good questions in class to clarify some misconceptions you had when we began this unit.*
>
> *As I look at your concept map, I see you still need to think about how the different organs use enzymes. I notice 5 errors related to how the different subsystems within the digestive system function. Check your notes from Monday and then talk with your learning partner. See if you can identify these five errors and what you might do to change them. After you have done that, check in with me so we can review the changes.*

Vignette 4: High School Language Arts Lesson on Characterization

At an English Department meeting, the two ninth grade teachers discuss how things are going in their American Literature classes. One teacher shares that her students are very engaged with the book, *The Great Gatsby*, but that many are having trouble making inferences that go beyond what is explicitly stated in the text. The other teacher agrees that he is seeing this in his class as well, and adds that when students make inferences during class discussion, they are based on their own experiences and not grounded in evidence from the text. They discuss how they might address a Learning Goal to deepen students' use of text-based evidence, and agree how they will capture students' progress on this in the next few lessons.

A few days later, after a lesson on indirect characterization, the teacher revisits the unit Learning Goals with her students.

- Students will be able to apply textual evidence to review issues of characterization and how characters can change over time.
- Students will be able to synthesize ideas from text and peers to accurately analyze theme and characterization.

The teacher assigns students a chapter reading for homework, and each student is given a character for review. The teacher discusses with students that she is interested in understanding the quality of inferences students make about characters and the evidence they select to support inferential claims. She instructs students to use the following note-taking template:

List Evidence from the Text	**Identify Inferences** I can make from this evidence…	**Analyze and Extend** Analyze the chapter evidence you have collected to identify key ideas about your assigned character.

Students are required to post their completed template on the class Google site and to participate in the online discussion board. The teacher posts a prompt about character motivation on the Google site and provides a model with a response of her own. She also posts the student Success Criteria.

(1) I can make two inferences about why my character behaves the way he or she does in the chapter.

(2) I can cite textual evidence to support my claims.

(3) I can build upon the ideas of at least one prior response from my classmates.

During her prep period the following morning, the teacher creates a checklist documenting student responses to each of the three Success Criteria. Once she gathers that information from the Google postings, she looks at each row to see which students had low quality inferences, (either inferences that were not supported by evidence or that were based on the students' own experience), and which students were able to do so successfully. She uses this information to make reading groups for that day's class to promote dialogue and interaction between students who have met the Success Criteria and those who have not yet met the Success Criteria.

While reviewing her checklist, the teacher makes a mental note to meet briefly with three students whose online responses raised questions about their comprehension of the chapter. She plans to confer with each student individually during class and ask them to summarize the chapter's events. She will provide feedback and outline next steps for each of the three students based on these check-in sessions. She notes that two of the students receive special education services, and quickly sends their special education teacher an email in order to touch base on the specific academic supports identified for this unit.

Finally, the teacher reviews the checklist to clarify additional evidence of student learning that will guide her instruction. She finds that the class was least successful with the criterion about building off of the ideas of others. Many students made cursory references to others' posts ("I agree with Alex" or "I want to build on what Samira said"), but they did not extend the idea or present a different perspective. She knows this skill is emphasized in the Common Core State Standards and it is something the class has been working on explicitly since the beginning of this unit. She uses this information to plan whole group instruction. Before reading groups, she will model elements of collaborative discussion and analysis to clarify what she will be listening for as she observes the discussion groups.

Vignette 5: High School Science Lesson on Voltage and Curent

A twelfth grade computer engineering class is studying electrical circuits. For homework one night, the teacher asks students to watch a video on the relationships among voltage, current, and resistance in simple circuits. The concepts in this video are foundational knowledge that the class will build upon throughout the unit. However, the teacher knows from past experience that students often have a number of misconceptions about this content, which he wants to surface and address before they move on to studying Ohm's Law and using it to solve for an unknown value in a circuit later in the week.

He shares with students the Success Criteria for the lesson.

(1) I use the terms voltage, current, and resistance accurately.

(2) I can demonstrate how voltage gets distributed over components connected in a series.

(3) I can demonstrate how current is the same through all components connected in a series.

(4) I can explain the impact of resistance on current.

He begins the next class by checking student understanding of the content presented in the video. He projects Figure 1 on the board.

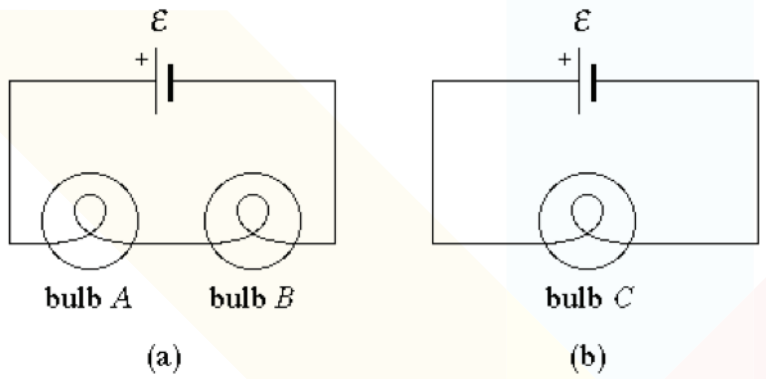


Figure 1. (a) A battery connected to two identical light bulbs A and B in series. (b) The battery is now connected to a single bulb C which is identical to bulbs A and B.

He gives students a minute to look at the diagram and then asks, "Which one of the four statements below is true?"

(a) Bulb A is brighter than bulb B.

(b) Bulb B is brighter than bulb C.

(c) Bulb A is as bright as bulb C.

(d) Bulb C is brighter than bulb A.

Rather than calling on a single student to answer the question, the teacher asks all students to "vote with their feet" by moving to one of the four corners of the room, labeled A, B, C, and D. As they move to their respective corners, he quickly notes on his clipboard which students have selected which response. Once every student has made his or her choice, the teacher sees that approximately half of the students have selected the correct response, D. In addition, the explicit logic of the four response options gives him insight into the misconceptions that may exist among the remaining 50% of students.

For example, he knows that one common mistake students make is thinking that the first bulb in a series will be brighter because it "gets the current first and uses it up." Students who selected option A likely have this misconception.

Another common error is thinking that bulb B will be brighter than bulb C because having two bulbs in the circuit will "double the brightness." Students who selected option B likely have this misconception.

Finally, students sometimes erroneously believe that the brightness of the bulbs will be the same in either circuit because the batteries supply equal voltage. Students who selected option C likely have this misconception.

The teacher asks students to talk to someone in their corner about why they believe they have selected the correct response. Following this exchange, he then asks students if any would like to change the corner they selected. Finally, he has students count off so that he can create small groups that contain a mix of students from various corners.

When students are seated at tables in their small groups, he gives them time to discuss their responses to the question and see if they can come to a consensus about which answer—or answers—are correct. As groups discuss, the teacher listens in, both to hear why students selected the incorrect response and to make sure that those students who selected option D can explain why it is correct. Further, the teacher notes the kinds of student explanations, illustrations, or examples that persuade their peers to shift in their understandings.

In one group, he finds that the student who selected the correct answer is having a hard time articulating why bulb C would be brighter. He joins the group and asks a few clarifying questions about resistance and current to jog her thinking and give her the vocabulary she needs to explain her rationale. In another group, the students quickly agree that option D is correct and their conversation has started to stray off topic. When the teacher joins the group, he challenges students to convince him that each of the other options is incorrect. In a third group, one student is adamant that bulb A and bulb C will be equally bright because the voltage is the same in each circuit. He notes that another student in the group is challenging his thinking by referencing what he learned about current and resistance in the YouTube video.

After a few minutes of discussion, the teacher explains that each group will have the opportunity to build the two circuits portrayed in Figure 1 to test their hypothesis. In small groups, students read the instructions for completing the experiment, look at the graphic organizer for recording their team's observations, and jot down

their questions. After answering questions and clarifying expectations for group work, the teacher passes out materials and the students begin.

As groups work, the teacher circulates to listen to their conversations, observe their interactions, and answer questions. On his clipboard, he makes notes about students' accurate use of the terms *voltage*, *current*, and *resistance* (Success Criterion 1) and corrects any inaccurate usage that he overhears.

By the end of the activity, every group is able to replicate the circuits in Figure 1 and discover that D is, in fact, the correct answer. They record their findings on their team's graphic organizer, which asks students to create colored drawings of each circuit that show the flow of current, the role of resistance, and how voltage is distributed. These graphic organizers are turned in to be reviewed by the teacher.

At the end of class, students engage in a discussion about what they discovered. The teacher asks questions about each circuit, including what was similar and what was different between the two. While it is clear that students can explain what they found, the teacher wants to know if they can explain why. Therefore, as their "ticket to leave" he asks each student to answer the following questions on separate sticky notes:

(1) Why are bulb A and bulb B equally bright? (Success Criteria 2 and 3)

(2) Why is bulb C brighter than bulb A and bulb B? (Success Criterion 4)

After class, the teacher reviews the explanations students have provided on their exit tickets and uses this information to plan the next day's instruction.