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Science

for English Language Learners

Developing Academic Language
Through Inquiry-Based Instruction

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Activating Language Through *Engage*

You May Wonder:

- What do I need to think about when designing an engaging science activity for English language learners?
- In what ways can I support the development and understanding of language and science in *Engage*?
- How can I assess students' language and prior knowledge?

The following chapters guide the teacher through a professional inquiry into the 5E model as a vehicle for supporting the English language development of English language learners. To that end, carefully selected classroom instructional scenarios that capture the best of teacher decision making and ELD practices are embedded in inquiry-based science instruction. Each chapter presents a stage of the 5E model through the lens of second-language development with in-depth discussion of ELD instructional features and strategies. Each chapter closes with a discussion of ELL assessment practices for the stage and a summary of tips for implementing the stage with ELLs. A final reflective section guides the reader through a series of questions that will support instructional planning for each stage.

Ms. Cortez's Class—Grade 2 Scenario

ELD Levels: Early Intermediate and Intermediate

***Part A: A First Glimpse at English Language Learner
Instruction During Engage***

A low buzz fills the room as the children anticipate the day's lesson. Two photographs of different earthworms in a variety of habitats lay on the tables. Each of the 20 Spanish/English bilingual students in this second-grade classroom sits side by side with a lab partner. At one side of the room, a girl wearing a pink sweater moves her head from side to side and shakes her hands in front of her. Another student sitting at the front sits on his legs and strains his neck in order to take a closer look at what is moving in and out of the pile of dirt in a bin next to the document camera. What are these students thinking as they sit at their desks anxiously awaiting the lesson of the day?

Since the beginning of the semester, the students have been engaged in a model of inquiry in which they learn by investigating through simple experiments. The teacher, Ms. Cortez, places a photograph of an earthworm under the document camera.

Ms. Cortez: *We have been studying the life cycles of animals. We have looked at the life cycles of frogs and mealworms. Today, we are going to investigate more closely what we observe about earthworms. Say the word with me: earthworms.*

What Is *Engage* for English Language Learners?

The 5E model begins with *Engage*. Students are exposed to a topic, concept, or idea in a way that stirs curiosity; it captures their attention in order to get their minds around the learning at hand. The activities teachers use for the *Engage* stage can include displaying a picture, conducting an experiment, posing a question, showing a video clip, and more. The idea is for students to make connections to their prior knowledge and begin to question what they know and what they do not know. Reasons for further exploration are established.

At this stage, English language learners are encouraged to share their thinking at the level of English proficiency that they are comfortable with and to use their primary language when applicable. Since the purpose of *Engage* is for students to generate prior knowledge and engage them in the thinking around science, English language learners should be encouraged to use either English or their primary language to talk about their thinking. It is the teacher who serves as a model of language for students at this stage. Through the academic language the teacher uses, the questions asked, and the introduction to science content, students are exposed to academic content-area language. This stage provides high levels of comprehensible input through the careful attention to academic language on the part of the teacher as well as the opportunity to look, feel, touch, and think science. The integration of language and content at this point comes from the personal experiences and prior knowledge that the ELL student brings to the learning environment. It is a great opportunity for teachers to informally assess students' English language development and make better instructional decisions about how to support ELLs throughout the remaining stages of the 5E model.

Reflecting on the opening scenario, the teacher has clearly established a motivating instructional climate filled with living earthworms and real-life photographs. These English language learners are excited and poised to engage in their new investigation.

Ms. Cortez's Class—Grade 2 Scenario

Part B: Looking Deeply into ELL Instruction During Engage

As Ms. Cortez says the word *earthworms*, she writes it on the board. She underlines the diagraph *th*.

Ms. Cortez: *The th may be a difficult sound to pronounce because it doesn't exist in Spanish. I want you to stick your tongue out and bite on it and blow through your teeth. Say the word with me, earthworms.*

The teacher has intentionally planned this moment of quick language practice because she understands that this sound is a new sound for her students. She wants to provide her students with opportunities to practice making this sound throughout this investigation.

Ms. Cortez: *We are going to begin our lesson by closely observing photographs with a partner and sharing what we notice about earthworms. Look at the photograph that I have projected on the whiteboard. I am going to demonstrate what you will do with your partner. She begins to model for the students how scientists observe photographs and use language to describe what they see: I notice that this is a photograph of an earthworm. The earthworm is long and has a curved body. I also want you to notice that the earthworm is shiny. Look at how the light is shining on its body, making the earthworm shiny.*

As the teacher shares her observations, she labels the photograph and points to specific parts of the earthworm's body. Before having the students get up to work on their own, she has each

student turn to a partner and share what he or she will do in the task. The teacher knows that it is critical for the students to understand what they are going to do prior to the activity. She circulates among them to check their understanding of the task.

In partners, the students huddle shoulder-to-shoulder and begin to share what they notice about earthworms in the photographs. The teacher moves from group to group to listen to the students' conversations and to record what they are saying. At times, she leans in closer and mediates the students' language.

Robert: *Oh, look at this earthworm. It is shiny.*

Desiree: *It blue on top.*

Robert: *I notice that it is curly.*

Ms. Cortez: *Yes, it is curly. Notice how the earthworm is coiled. (She traces the curled-up shape of the earthworm.)*

As the teacher signals, students rotate from table to table. After the full rotation, each student is asked to select a word and to share one thing that he or she noticed about the photographs of the earthworms.

The teacher is satisfied that her students have had varied opportunities to think and talk about what they know about earthworms, using the language they already have. She has modeled new vocabulary and language forms. She has encouraged her students through questioning to express their thinking in the language they bring. Now, her students are ready to move on to a more complex way of thinking and talking that includes writing.

For the next step of this activity, an Inquiry Chart is placed under each photograph. It is a large sheet of construction paper divided into two sections. The right side is labeled *I notice ...* and the left side is labeled *I wonder*

As the students gather on the rug, the teacher demonstrates how to complete the Inquiry Charts by having a student role-play with her.

Ms. Cortez: *Let's look at this photograph. I notice that the earthworm is long. What do you notice?*

Raquel: *It has lines.*

Ms. Cortez: *Yes, you're right. As we look closer, we see that the body is divided into parts. It is segmented. Let's write that down. Now look at the chart. It says, "I wonder" What questions do you have about this earthworm? What are you wondering about?*

Raquel: *Does it have eyes?*

Ms. Cortez: *Let's use this frame: I wonder if it has eyes. Write that down on the chart.*

In partners, the students move from table to table recording their observations and questions. After 10 minutes, each set of partners moves from table to table reading all of the responses. Their initial step is to select one photograph that they found engaging. From that chart, each student selects one response under *I notice ...* to share out later in an activity called a Whip-Around. Moving from group to group, each student reads one *I notice ...* response. Then, in the same manner, students share out one response from the *I wonder ...* column.

Activating Language in *Engage*

Teachers of English language learners must develop a strong awareness of how language is used in each of the 5E stages. From a clear sense of the workings of language, teachers can determine how to maximize all opportunities for second-language development through thoughtful, purposeful instructional design. The interplay of the key language instruction dimensions of *talk*, *thought*, and *interaction* is strongly evident in *Engage*. The previous scenario provides many clear examples of intentional planning that supports the English academic language development of ELLs that will be discussed in this section.

During *Engage*, the instructional environment cognitively engages students and promotes their language development through the interaction of teacher talk and student talk, which is achieved through the features of ELL practice listed in Figure 4.1.

Figure 4.1 Essential Features for Developing Academic Language in *Engage*

- Tapping into prior knowledge
- Establishing a supportive, low-anxiety environment for language practice and use
- Selecting instructional resources, such as visuals, real objects, or texts to support second-language understanding
- Modeling language use by teacher (or peers)

Tapping Into Prior Knowledge

Whether in their primary language (L1) or their second language (L2), the hands-on experiential activities of *Engage* compel students to make connections to what they know (schema) and to formulate questions about what they want to know (inquiry). At any age, English language learners will use language to express the meaning that they are making during natural interaction with peers and adults. This language will serve as the catalyst of their inquiry process as the language they have to express their prior knowledge is brought to the forefront of the instructional experience.