

Vignette 5.3. Science Informational Research Reports on Ecosystems Integrated ELA and Science Instruction in Grade Five

Background

Mr. Rodriguez's fifth-grade class contains a range of students, including 12 ELs at the Bridging level of English language proficiency and several students who are former ELs in their first and second years of reclassification. The class is in the middle of an integrated ELA and science unit on ecosystems. Mr. Rodriguez began the unit by building students' content knowledge of one local ecosystem (freshwater). He modeled the process of researching the ecosystem to foster conceptual scientific knowledge about ecosystems and develop his students' understandings of how science texts are written. Mr. Rodriguez is preparing his students to conduct their own research on an ecosystem of their choice, write an informational science report, and create a multimedia presentation about the ecosystem they research. Students work in groups to complete their written research reports and companion multimedia assignments. Mr. Rodriguez and his colleagues collaboratively designed this unit to incorporate specific instructional practices that they have found to be particularly helpful for ELs and for students with special needs. The teachers want to make sure that all of their students enter middle school ready to interact meaningfully with complex texts and tasks across the disciplines.

Lesson Context

To develop his students' understandings of ecosystems, Mr. Rodriguez reads multiple complex informational texts about freshwater ecosystems aloud to the class, and the students also read texts on the topic together during whole and small group reading instruction. He explicitly teaches some of the general academic vocabulary words during ELA time and domain-specific words during science instruction. Mr. Rodriguez pays particular attention to developing his students' awareness of cognates and he has posted a cognate word wall in the class alongside the vocabulary wall containing general academic vocabulary (e.g., *despite*, *regulate*, *restore*) and domain-specific vocabulary (e.g., *species*, *predator*, *decomposer*) from the ecosystem unit.

During science instruction, students view multimedia and discuss the new concepts they are learning in structured extended discussions with guiding questions. They also engage in science practices, such as observing a freshwater ecosystem, assessing the water quality in the ecosystem, and identifying the connections between poor water quality and the overall health of the ecosystem. The class takes a walking fieldtrip to a local pond to collect data, which they document in their science journals and then discuss and record on a chart when they return to the classroom. They also design and conduct an experiment to investigate which everyday materials can most effectively filter dirty water.

Now that his students have developed some knowledge about freshwater ecosystems, as well as some critical domain-specific vocabulary (e.g., *ecosystem*, *species*, *habitat*, *watershed*) related to the topic, Mr. Rodriguez plans to use some mentor texts to model the kind of writing he wants students to emulate when they write their group research reports. He also uses these mentor texts as a way to demonstrate how to read complex informational texts more closely. The learning target and cluster of CA CCSS for ELA/Literacy and CA ELD Standards in focus for today's lesson are the following:

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Learning Target: The students will collaboratively reconstruct a complex text about ecosystems. They will apply their content knowledge and knowledge of the language of the text type.

CA CCSS for ELA/Literacy: *W.5.2 - Write informative/explanatory texts to examine a topic and convey ideas and information clearly . . . ; W.5.4 - Produce clear and coherent writing (including multiple paragraph texts) in which the development and organization are appropriate to task, purpose, and audience; W.5.7 - Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic; L.5.3 - Use knowledge of language and its conventions when writing, speaking, reading, or listening; L.5.3a - Expand, combine, and reduce sentences for meaning, reader/listener interest, and style . . . L.5.6 - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases . . .*

CA ELD Standards (Bridging): *ELD.PI.5.1 - Contribute to class, group, and partner discussions . . . ; ELD.PI.5.4 - Adjust language choices according to purpose, task (e.g., facilitating a science experiment), and audience with light support; ELD.PI.5.10a - Write longer and more detailed literary and informational texts (e.g., an explanation of how camels survive without water for a long time) collaboratively (e.g., joint construction of texts with an adult or with peers) and independently using appropriate text organization and growing understanding of register; ELD.PII.5.4 - Expand noun phrases in an increasing variety of ways . . . ; ELD.PII.5.5 - Expand and enrich sentences with adverbials; ELD.PII.5.6 - Combine clauses in a wide variety of ways; ELD.PII.5.7 - Condense clauses in a variety of ways . . .*

Lesson Excerpts

In today's lesson, Mr. Rodriguez engages his students in a text reconstruction (also known as dictogloss) lesson. The goal, he explains to the class, is for them to learn how to write research reports. The purpose of this text type is to report on information from a variety of sources about a single topic. He reminds his students that they have read-and he has read aloud to them-many texts about ecosystems. He also recalls that they have been learning and using language to discuss ecosystems as they have engaged in various science tasks related to ecosystems. He tells them that the purpose of the lesson is to apply their knowledge of ecosystems and their knowledge of the language used to describe and analyze ecosystems. The steps of today's lesson are written in Mr. Rodriguez's planning notebook as follows.

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Text Reconstruction Procedure

1. *Read once:* Teacher reads a short section of the text (no more than 60 seconds) aloud while students **just listen**.
2. *Read twice:* Teacher reads the text a second time while students **listen and take notes** (bullet points with no more than a few words—make sure they know how).
3. *Reconstruct:* Students work with a partner to collaboratively **reconstruct the text** using their notes (lots of discussion should happen here). (If there is time, have the partners work with another set of partners to further refine their reconstructions.)
4. *Check and compare:* Teacher shows the original text to students and invites students to discuss differences or similarities between the original and their texts.
5. *Deconstruct:* Teacher highlights for students a few key language features in the text. (Later, show them how to deconstruct, or unpack, the text even further to reveal more of the **language features and patterns**.)

Mr. Rodriguez explains that when students reconstruct, or rewrite, the short text with their partner, he wants them to try to get as close as they can to recreating the text he read to them.

Mr. Rodriguez: You're not trying to copy me exactly, but the text you reconstruct has to make sense and use the language of information reports on ecosystems. This is one way we're practicing how to write information reports before you write your own.

A portion of the text Mr. Rodriguez reads follows.

Freshwater ecosystems are essential for human survival, providing the majority of people's drinking water. The ecosystems are home to more than 40 percent of the world's fish species. Despite their value and importance, many lakes, rivers, and wetlands around the world are being severely damaged by human activities and are declining at a much faster rate than terrestrial ecosystems. More than 20 percent of the 10,000 known freshwater fish species have become extinct or imperiled in recent decades. Watersheds, which catch precipitation and channel it to streams and lakes, are highly vulnerable to pollution. Programs to protect freshwater habitats include planning, stewardship, education, and regulation. (National Geographic Society n.d.)

Mr. Rodriguez reads the text twice. The first time his students just listen; the second time they take notes. Before today's lesson, he taught his students how to take brief notes, recording key words or phrases as they were reading a text or viewing a video. Today, they are using their notetaking skills in a new way while Mr. Rodriguez reads aloud. Afterwards, they work in pairs to reconstruct the text. Mr. Rodriguez circulates around the room so he can listen to their conversations and provide support where needed. He stops at a table where Sarah and Ahmad are busy reconstructing their text.

Ahmad: I have *human survival, water, and 40 percent of fish*. I think he said that the freshwater ecosystems, we have to have them for to survive.

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- Sarah: Yeah, I think that's right, and it makes sense because we learned about that. But I think there was something more about water. I have *drinking water*, so I think he said that the freshwater ecosystem give us most of our drinking water, so maybe that's why we have to have them to survive.
- Ahmad: What should we write? How about, "We have to have the freshwater ecosystem for to survive because they give us most of our drinking water?"
- Sarah: (Nodding.)
- Mr. Rodriguez: Can we take a look at your notes again, Ahmad? Before you said you wrote, *human survival*, and I'm wondering if the two of you can figure out how to use that in your reconstruction.
- Ahmad: (Thinking for a moment.) Can we write, "We have to have the freshwater ecosystem for human survival because they give us most of our drinking water?"
- Mr. Rodriguez: What do you think, Sarah?
- Sarah: Yeah, that sounds right. I think that sounds like what you said, and it sounds more like a science book.
- Mr. Rodriguez: Yes, it does sound more like a science book. But why is *human survival* important here?
- Ahmad: (Thinking.) Because we have to have the fresh drinking water so we can survive, so if we say *human survival*, that means the same thing.
- Sarah: And when we say "human," that means all the people in the world, not just us.

Mr. Rodriguez continues to circulate around the room, providing just-in-time scaffolding to students to stretch their thinking and language. Mostly, he asks them to refer to their notes for the words to use and also to make sure the text they reconstruct makes sense based on what they have learned about freshwater ecosystems. He prompts them to use the words and phrases they have in their notes and to use their knowledge of connecting/condensing and expanding/enriching their ideas. When time is up, Mr. Rodriguez asks if any volunteers would like to share their reconstruction with the class. Ahmad and Sarah share their reconstruction, and Mr. Rodriguez recognizes them for using critical terms, such as *human survival* and *freshwater fish species*, as well as some of the math terms (such as, *40 percent* of fish species in the world).

After students have shared their reconstructions, Mr. Rodriguez shows the class the original text and asks them to talk briefly with their partners about similarities and differences. He explains some of the domain-specific and general academic vocabulary and phrasing his students found particularly challenging to reconstruct (e.g., *highly vulnerable to pollution*, *despite their value and importance*).

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Next Steps

The following week, Mr. Rodriguez shows his class how the informational texts they are reading are organized by big ideas. Mr. Rodriguez writes the big ideas of one book on chart paper as headings (e.g., geographical characteristics; food webs—producers, consumers, secondary consumers; natural factors—climate, seasons, and natural disasters; human impact—pollution, overfishing) and writes some of the details beneath them. Looking at how the mentor texts are organized helps the students see how they can create categories to guide their research and structure their writing. Mr. Rodriguez facilitates a class discussion and guides the students to create an outline they will use to conduct their own research projects and write information reports. The class decides on the following outline, using their own words to describe the stages and phases in the text:

Stages and phases	Information Report Outline
Stage 1	<p><i>General statements:</i></p> <ul style="list-style-type: none"> • Tell/define what ecosystems are • Identify what ecosystem this one is
Stage 2 Phases (subtopics)	<p><i>Description of the ecosystem:</i></p> <ul style="list-style-type: none"> • Describe the geography of the ecosystem • Describe what lives there and the food web • Describe the natural factors that harm the ecosystem • Describe what people have done to affect the ecosystem • Describe ways that people can fix the damage they have caused
Stage 3	<p><i>Conclusion:</i> Restate the gist of the report's findings and conclude with a general statement.</p>

Once the reports are complete, they are posted around the room for other students to read, and students present their multimedia projects to classmates as well as to a first-grade class they have been reading aloud to all year. Mr. Rodriguez evaluates the informational reports using a rubric his district has provided based on the CA CCSS for ELA/Literacy, the CA ELD Standards, and the Next Generation Science Standards.

As they engaged in learning about the freshwater ecosystem, assessed the water quality in the local pond they visited, and learned about the consequences of unhealthy ecosystems, the students had many lively discussions about what kinds of changes they could make to help protect the ecosystem. Mr. Rodriguez brings in examples of letters to the editor that other students have written over the years on various topics. He guides his students in determining how an effective letter to the editor is constructed, including taking a stance that would be likely to give a writer greater credibility. The students also discuss the types of language resources and evidence they might want to select if they were to write their own letters to the editor of the local newspaper. They unanimously vote to work in small groups to write letters

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that identify different negative consequences of unhealthy freshwater ecosystems (e.g., fish asphyxiation, dirty water unfit for consumption, habitat depletion), choosing their writing groups based on interest. After exchanging the letters between groups for peer feedback based on a rubric for letters to the editor letters and a list of academic vocabulary used in the lesson, teams write final drafts. The students keep individual copies of the rubrics and final drafts in their writing portfolios to document growth over time. Each group's short letter is published within a few weeks, and the class is featured on the local news.

Resources

National Geographic Society. n.d. "Freshwater Threats." *National Geographic*.

Sources

Lesson adapted from

Spycher, Pamela, and Karin Linn-Nieves. 2014. "Reconstructing, Deconstructing, and Constructing Complex Texts." In *The Common Core State Standards in English Language Arts/Literacy for English Language Learners: Grades K-5*, edited by Pam Spycher. Alexandria, Virginia: TESOL Press.

Swain, Merrill. 1998. "Focus on Form Through Conscious Reflection." In *Focus on Form in Classroom Second Language Acquisition*, edited by Catherine Doughty and Jessica Williams, 64-81. New York, NH: Cambridge University Press.

Wajnryb, Ruth. 1990. *Grammar Dictation*. Oxford: Oxford University Press.

Additional Information

Web sites

- The Public Broadcasting System (<http://www.pbs.org>) has more ideas for teaching about ecosystems (<http://www.pbslearningmedia.org/>).
- Achieve the Core (www.achievethecore.org) has student work samples (<http://achievethecore.org/page/504/common-core-informative-explanatory-writing>) and ideas on evaluating student writing.

Recommended reading

Derewianka, Beverly, and Pauline Jones. 2012. *Teaching Language in Context*. South Melbourne, Victoria: Oxford University Press.

Brisk, Maria E., Tracy Hodgson-Drysdale, and Cheryl O'Connor. 2011. "A Study of a Collaborative Instructional Project Informed by Systemic Functional Linguistics: Report Writing in the Elementary Grades." *Journal of Education* 191 (1): 1-12. (<http://www.bu.edu/journalofeducation/files/2011/11/BUJOE-191.1.Brisketal.pdf>).

Vignette 5.4. Learning About Cohesion in Science Designated ELD Instruction in Grade Five

Background

During designated ELD, Mr. Rodriguez delves deeper into the language of the texts the class is using for their ecosystems research projects. (See vignette 5.3). He and his colleagues are all teaching the same integrated ELA and science unit in their fifth-grade classroom. This makes it possible to share students when they regroup for designated ELD and provide instruction that builds into and from science and ELA, targeting their students' particular language learning needs. For his ELD class, Mr. Rodriguez works with a large group of EL fifth graders who are at the Bridging level of English language proficiency while one of his colleagues works with a small group of students at the Emerging level who are new to English, and a third teaches the native English speaking students and reclassified ELs.

Lesson Context

In integrated ELA and science instruction, Mr. Rodriguez has focused on text structure and organization and has taught his students general academic and domain-specific vocabulary pertaining to the ecosystem unit. He has also worked with his students, particularly during writing instruction, on structuring their sentences and paragraphs in more grammatically complex ways, according to the expectations of the CA CCSS for ELA/Literacy and the CA ELD Standards. Even so, he observes that some EL students at the Bridging level of English language proficiency experience challenges reading some of the complex science texts. He also observes that when they write, their texts are sometimes choppy and lack cohesion. The learning target and cluster of CA ELD Standards in focus for today's lesson are the following:

Learning Target: The students will discuss ways of using language that help create cohesion, including connecting and transition words and words for referring to ideas mentioned elsewhere in the text.

CA ELD Standards (Bridging): *ELD.PI.5.6a* – Explain ideas, phenomena, processes, and text relationships (e.g., compare/contrast, cause/effect, problem/solution) based on close reading of a variety of grade-level texts and viewing of multimedia, with light support; *ELD.PII.5.2a* – Apply increasing understanding of language resources for referring the reader back or forward in text (e.g., how pronouns, synonyms, or nominalizations refer back to nouns in text) to comprehending texts and writing cohesive texts; *ELD.PII.5.2b* – Apply increasing understanding of how ideas, events, or reasons are linked throughout a text using an increasing variety of academic connecting and transitional words or phrases (e.g., consequently, specifically, however) to comprehending texts and writing cohesive texts.

Lesson Excerpts

Today, Mr. Rodriguez is teaching his students how to identify words and phrases that help create cohesion, that is, help texts *hang together* or *flow*.

Mr. Rodriguez: Today, we're going to discuss some of the ways that writers help guide their readers through a text. They use different words and phrases to make sure that their texts *hang together* and *flow*. These words help to link ideas throughout a text, and they help the reader *track* the meanings throughout the text. We call this way of using language *cohesion*.

Mr. Rodriguez writes the word *cohesion* on a chart, along with a brief explanation, which he says aloud as he writes:

Vignette 5.4. Learning About Cohesion in Science Designated ELD Instruction in Grade Five (cont.)

Cohesion:

- How information and ideas are connected in a text
- How a text hangs together and flows

Mr. Rodriguez: Sometimes, it might be hard to identify the language that creates cohesion in a text, so we're going to discuss it. We're going to dig into some passages you've been reading in science and take a look at how writers use language so that it will be easier for you to see it in the texts you're reading for your research reports. Once you start to see the many different ways that writers create cohesion in their writing, you'll have some more ideas for how you can do that when you write your own ecosystem informational reports.

Using his document camera, Mr. Rodriguez displays a short passage from a familiar text the students have been reading in science. The text is quite challenging, and Mr. Rodriguez has spent a fair amount of instructional time on the language and content of the text, including showing the students where *nominalization* occurs (e.g., *modification*, *flood protection*, *water diversions*) and teaching them the meaning of some of these words. Mr. Rodriguez models, by thinking aloud and highlighting the text, how he identifies the language in the text used to create cohesion. The passage he shows them follows.

Wetlands perform many important roles as an ecosystem. One is to provide an important habitat for birds, fish, and other wildlife. Another is to contribute to flood protection by holding water like a sponge. By doing this, they keep river levels normal and filter the water. However, California's wetlands are in danger, and their ability to perform these important roles is threatened. Unfortunately, they continue to be drained for agriculture or filled for development. Other activities that harm them include modifications to the watershed such as dams or water diversions, not to mention climate change. Consequently, California has lost more than 90% of its wetlands, and today, many of the ones remaining are threatened. (California Environmental Protection Agency 2014)

Mr. Rodriguez highlights the terms that may be more familiar and transparent to students: *however*, *unfortunately*, *consequently*. He briefly explains the meaning of these words, noting that such *text connectives* are very useful for helping readers navigate through texts. He then delves more deeply into the language in the passage that serves a cohesive function by explaining that *however* is signaling to the reader that something different is going to be presented and that it will contrast with what came right before it. He models his understanding of the text by reading the rest of the sentence and then reading from the beginning of the passage, paying particular attention to the connecting word, *however*.

Mr. Rodriguez: *However, California's wetlands are in danger, and their ability to perform these important roles is threatened.* Hmm . . . I know that what it's saying here is contrasting with what came right before it. In the beginning, it was discussing all the great things that ecosystems do, or the important roles they have. Then, it says that they are having a hard time doing these things. So the word *however* links the ideas that came right before it with the new information.

Vignette 5.4. Learning About Cohesion in Science Designated ELD Instruction in Grade Five (cont.)

When he comes to the word *unfortunately*, he explains that this word signals to readers that something negative is going to be presented, and he confirms this by reading on. When he comes to the word *consequently*, he asks his students to briefly discuss with one another what they think the word is doing to help connect ideas in the text.

Ernesto: I think that when you use the word *consequently*, you're saying that something is happening because something else happened. Like, *consequently* means *it's a result*.

Mr. Rodriguez: Can you say more about that? What ideas is the word *consequently* connecting in this text?

Ernesto: (Thinks for a moment, then points to the document displayed on the screen) Right there, where it says "they continue to be drained" and "other human activities" . . . like, modif . . . modifications and dams.

Talia: And climate change. That does it, too.

Mr. Rodriguez: So, what you're saying is that the word *consequently* is linking those activities, those terms—*draining for agriculture, filling in the wetlands, making dams or water diversions, and climate change*—it's linking those activities with . . . ? Turn to your partner and discuss what ideas the word *consequently* is connecting.

The students grapple with this question, but through the scaffolding Mr. Rodriguez has provided, they determine that the word *consequently* connects harmful human activities to the loss of and threat to wetlands. Mr. Rodriguez continues to model how he identifies the other language in the text that creates cohesion, including pronouns that refer back to nouns (e.g., *they, their*) and other *referring* words that may not be as obvious. For example, he explains that the words *one* and *another* refer to the word *roles*, which appears in the first sentence. He highlights other referring words and the words they refer back to, and he draws arrows between them to make the reference clear. After modeling one or two examples, he asks students to tell him what the words are referring to, and he marks up the text with additional arrows so they can see clearly what is being referenced. The passage he shows, along with the language he highlights while modeling his thinking process, follows.

Wetlands perform many important roles as an ecosystem. **One** is to provide an important habitat for birds, fish, and other wildlife. **Another** is to contribute to flood protection by holding water like a sponge. By doing **this**, **they** keep river levels normal and filter the water. **However**, California's wetlands are in danger, and **their** ability to perform **these important roles** is threatened. **Unfortunately**, **they** continue to be drained for agriculture or filled for development. Other activities that harm **them** include modifications to the watershed such as dams or water diversions, not to mention climate change. **Consequently**, California has lost more than 90% of its wetlands, and today, many of **the ones** remaining are threatened. (California Environmental Protection Agency 2014)

After Mr. Rodriguez has modeled this process, he provides students with similar passages, and asks them to work in pairs to locate any words that create cohesion by following the same

Vignette 5.4. Learning About Cohesion in Science Designated ELD Instruction in Grade Five (cont.)

process he shared with them. At the end of the lesson, he asks students to share what they found and explain how the words they highlighted create cohesion in the text by linking ideas and information. As the class generates a list of words that help the text hang together, Mr. Rodriguez writes them down on a piece of chart paper for all to see. Later that week, the students will work in small groups to categorize one form of cohesive language, text connectives. The chart will be posted so that the students can draw upon the words and phrases when they write their research reports. Mr. Rodriguez chooses the categories, but the students decide where the words go (with his guidance), and they agree on a title for the chart, which follows.

Language to Connect Ideas (Cohesion)		
Adding	Contrasting	Sequencing
in addition furthermore similarly also	however despite this instead otherwise unfortunately	to start with to summarize in conclusion finally
Cause/Result	Time	Clarifying
therefore consequently because of this in that case	next meanwhile until now later	that is in other words for example for instance
Words for referring back to people or things: they, their, it, them, this, these, those, one, another, the ones		

Teacher Reflection and Next Steps

After teaching these lessons on cohesion, Mr. Rodriguez observes that many of his students begin to use these language resources in their writing. For example, instead of repeating the word *ecosystems* in each sentence (e.g., Ecosystems are . . . , Ecosystems have . . . , Ecosystems can . . .), they use pronouns to refer back to the first usage of the word. Similarly, many of his students begin to experiment with the connecting words listed on the chart that the students generated during ELD. He also notices that his students are becoming more aware of this type of language they encounter while reading. Throughout the day, he responds enthusiastically when students tell him when they find other examples of cohesion.

Resources

Adapted from

California Environmental Protection Agency. 2014. "California Wetlands." *California Water Quality Monitoring Council*. (http://www.mywaterquality.ca.gov/eco_health/wetlands)

Additional Information

- National Geographic (www.nationalgeographic.com) has many resources for teachers on ecosystems, including freshwater ecosystems (<http://environment.nationalgeographic.com/environment/freshwater/>).