Close Reading of Informational Texts in Science, Technology, Engineering, and Mathematics

Learning Targets
- Use specific text evidence to support responses to and analysis of science and technical texts. 6.6(A), 6.8(D)
- Evaluate details to determine the key ideas or conclusions of a text; provide an accurate summary of the text in ways that maintain meaning. 6.6(G), 6.6(D)
- Use context clues and resources to determine the meanings of words and phrases as they are used in a scientific or technical context. 6.2(A), 6.2(B)
- Discuss newly acquired vocabulary and how these words relate to understanding the meaning of the passage. 6.6(C), 6.6(F)
- Analyze the text structure and author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text. 6.5(A)
- Deepen understanding by reading with an established purpose, asking questions about a text, analyzing evidence to support analysis of research findings, evaluating key ideas, making inferences, and synthesizing information. 6.3(A), 6.3(C), 6.3(F), 6.5(G), 6.5(H)
- Independently monitor comprehension and make adjustments when needed in order to read and comprehend scientific technical texts. 6.3, 6.3(I)

Preview
In this workshop, you will read two texts and two charts about STEM topics. You will practice close reading, using strategies that will help you make meaning of the text and the charts features. You will practice close reading strategies that will help you diffuse the difficult language used in the writing to help you understand the texts. You will paraphrase and analyze the texts to infer what they have in common.

Close Reading for Meaning
Scientific texts contain a lot of information. They are full of facts, evidence, and data. In order to make that information accessible to readers, authors of scientific texts structure their texts in certain ways. Common organizational structures for scientific texts include: cause/effect, compare/contrast, description, problem/solution, and sequencing (often chronological order). Becoming familiar with these organizational structures helps readers to understand scientific texts.

One way authors make information easier to understand is by using subheadings to organize information. The paragraphs under a subheading all contain information that is related to each other. When reading, we can use text features, like subheadings, to help organize the information in our minds, to aid in notetaking, and to help locate important facts.

LEARNING STRATEGIES:
- Chunking the Text
- Diffusing, Close Reading, Marking the Text, Rereading, Previewing, Summarizing, Paraphrasing

ACADEMIC VOCABULARY
Organizational structures refer to the way an author presents information. A subheading is a text feature that often appears in scientific texts. Subheadings separate the text into clear sections to help readers understand and locate information more easily.

TEACHER TO TEACHER
Each workshop has four activities. Pacing guidance is provided for each activity, but pacing will be flexible based on the needs of your students and the demands of your schedule.

Texas Essential Knowledge and Skills
Focus Standards:
6.1(A) Listen actively to interpret a message, ask clarifying questions, and respond appropriately.
6.1(D) Participate in student-led discussions by eliciting and considering suggestions from other group members, taking notes, and identifying points of agreement and disagreement.
6.2(A) Use print or digital resources to determine the meaning, syllabication, pronunciation, word origin, and part of speech.
6.2(B) Use context such as definition, analogy, and examples to clarify the meaning of words.
Introducing the Strategy: Paraphrasing

Paraphrasing is a strategy for close reading of text. Using this strategy, the reader focuses on a portion of a passage and then restates the most important information in his or her own words. Putting the author’s ideas in one’s own words helps one understand a challenging text.

Guided Practice

First Reading: First Impressions

- Glance at the subheadings to get a sense of what information is covered in the text, and then read the text silently the first time. Focus on understanding the meaning of the passage. 6.5(A), 6.8(D)(iii)

- As you read, diffuse underlined words by replacing them with synonyms or with the definitions next to the text. 6.2(A), 6.2(B)

Informational Text

from

CALIFORNIA INVASIVE PLANT INVENTORY

by California Invasive Plant Council, 2006

The California Invasive Plant Inventory categorizes non-native invasive plants that threaten the state's wildlands. Categorization is based on an assessment of the ecological impacts of each plant. The Inventory represents the best available knowledge of invasive plant experts in the state.

The Inventory categorizes plants as High, Moderate, or Limited, reflecting the level of each species' negative ecological impact in California. Other factors, such as economic impact or difficulty of management, are not included in this assessment. It is important to note that even Limited species are invasive and should be of concern to land managers. Although the impact of each plant varies regionally, its rating represents cumulative impacts statewide. Therefore, a plant whose statewide impacts are categorized as Limited may have more severe impacts in a particular region. Conversely, a plant categorized as having a High

Texas Essential Knowledge and Skills

6.3 The student reads grade-level text with fluency and comprehension. The student is expected to adjust fluency when reading grade-level text based on the reading purpose.

6.4 The student reads grade-appropriate texts independently. The student is expected to self-select text and read independently for a sustained period of time.

6.5(A) Establish purpose for reading assigned and self-selected text.

6.5(F) Make inferences and use evidence to support understanding.
cumulative impact across California may have very little impact in some regions.

3 The Inventory Review Committee, Cal-IPC staff, and volunteers drafted assessments for each plant based on the formal criteria system described below. The committee solicited information from land managers across the state to complement the available literature. Assessments were released for public review before the committee finalized them. The 2006 list includes 39 High species, 65 Moderate species, and 89 Limited species. Additional information, including updated observations, will be added to this website periodically, with revisions tracked and dated.

Definitions

4 The Inventory categorizes "invasive non-native plants that threaten wildlands" according to the definitions below. Plants were evaluated only if they invade California wildlands with native habitat values. The Inventory does not include plants found solely in areas of human-caused disturbance such as roadsides and cultivated agricultural fields.

- Wildlands are public and private lands that support native ecosystems, including some working landscapes such as grazed rangeland and active timberland.
- Non-native plants are species introduced to California after European contact and as a direct or indirect result of human activity.
- Invasive non-native plants that threaten wildlands are plants that 1) are not native to, yet can spread into, wildland ecosystems, and that also 2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes.

Inventory Categories

5 Each plant on the list received an overall rating of High, Moderate or Limited based on evaluation using the criteria system. The meaning of these overall ratings is described below. In addition to the overall ratings, specific combinations of section scores that indicate significant potential for invading new ecosystems triggers an Alert designation so that land managers may watch for range expansions. Some plants were categorized as Evaluated But Not Listed because either we lack sufficient information to assign a rating or the available information indicates that the species does not have significant impacts at the present time.

- High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- Moderate – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation.

ACTIVITY 1 (continued)

Before sharing the text with students, you may choose to investigate whether or not your state has a similar inventory to California. If so, you may want to share information with students from that inventory to make the topic more personal and relevant since it is about their surrounding environment. If there are specific plants that are in the inventory that are found on school property, you may choose to point them out to students. If available, consider consulting with a science teacher at your school about this information.

4 First Reading: In Activity 1, students are to first focus on reading the text to themselves silently to gain a general understanding of the text structure and unfamiliar words.

Differentiated Instruction

This text may be challenging. Providing contextual information, careful guidance through diffusing, and an examination of vocabulary and sentence structure will yield greater understanding. Some students may benefit from creating a visual representation or graphic organizer for the information in the third section to aid in comprehension of the distinctions between species that are categorized as high, moderate, or limited.

5 After the first reading, you may want to diffuse the text with your students, working with the bolded words. Use this as an opportunity for a lively conversation about vocabulary and meaning. This may be the time to supply students with more context information.

Texas Essential Knowledge and Skills

6.5(G) Evaluate details read to determine key ideas.
6.5(H) Synthesize information to create new understanding
6.5(I) Monitor comprehension and make adjustments such as re-reading, using background knowledge, asking questions, and annotating when understanding breaks down.
6.6(C) Use text evidence to support an appropriate response.
6.6(D) Paraphrase and summarize texts in ways that maintain meaning and logical order.
6.6(F) Respond using newly acquired vocabulary as appropriate.
structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

- Limited - These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Second Reading: Vocabulary in Context

- Listen and follow along as your teacher reads the passage aloud.
- As you read along, circle words and/or phrases that you do not know or that you feel are important to the meaning of the passage.
- Use context clues and/or a dictionary to determine or clarify the meaning of these words and phrases.

Check Your Understanding

1. Pair with another student and determine the best way to paraphrase sections of the text. Discuss and name the text features you can use to help chunk texts into meaningful sections that can be paraphrased. Discuss how chunking the text before paraphrasing can help make the task of paraphrasing easier.

   The passage can be chunked based on the three subheadings: The Inventory, Definitions, and Inventory Categories. Readers can read one “chunk” at a time and then put it in their own words, rather than waiting until the end of the entire text and then trying to put it in their own words.

2. Using the definitions in the margin, define the term “invasive non-native plant.” Then, paraphrase the “Definitions” section of the text. According to the text, what is an invasive non-native plant?

   An invasive non-native plant is one that has spread into an area that it would not naturally grow in. Invasive plants are those that are not native to the area and that threaten ecosystems. They threaten native plants by spreading into their habitat, making hybrids with native plants, and by changing the ecosystem so native plants have a hard time surviving.
Third Reading: Text-Dependent Questioning

- Read the passage a third time and respond to the text-dependent questions on the next pages. 6.6(C)
- As your class discusses the text, write your responses to each question and highlight the textual evidence that supports your answer. 6.6(C), 6.6(E)
- During discussions, you may also want to annotate the text to record a new or different meaning of the text. 6.6(E), 6.6(I)

Background Information: Invasive species are plants or animals that are introduced to a certain area through human contact. Sometimes, a plant or animal is brought to an area to control the growth of a different species. However, these invasive species can also cause harm to the native populations. The California Invasive Plant Council studied plants around the state and categorized invasive plants based on their negative impact to the environment. Some invasive species are more harmful than others. This passage explains what an invasive plant is and how California categorizes invasive species.

from “California Invasive Plant Inventory” by California Invasive Plant Council, 2006

1. What is the purpose of the plant inventory? Cite evidence from the article to support your answer.

The California Invasive Plant Inventory categorizes non-native invasive plants that threaten the state’s wildlands. Categorization is based on an assessment of the ecological impacts of each plant. The Inventory represents the best available knowledge of invasive plant experts in the state.

The Inventory categorizes plants as High, Moderate, or Limited, reflecting the level of each species' negative ecological impact in California. Other factors, such as economic impact or difficulty of management, are not included in this assessment. It is important to note that even Limited species are invasive and should be of concern to land managers. Although the impact of each plant varies regionally, its rating represents cumulative impacts statewide. Therefore, a plant whose statewide impacts are categorized as Limited may have more severe impacts in a particular region. Conversely, a plant categorized as having a High cumulative impact across California may have very little impact in some regions.

3. The Inventory Review Committee, Cal-IPC staff, and volunteers drafted assessments for each plant based on the formal criteria system described below. The committee solicited information from land managers across the state to complement the available literature. Assessments were released for public review before the committee finalized them. The 2006 list includes 39 High species, 65 Moderate species, and 89 Limited species. Additional information, including updated observations, will be added to this website periodically, with revisions tracked and dated.

ACTIVITY 1 (continued)

10 Third Reading: During this reading, students should focus on the text-dependent questions. These interpretive questions lead students into textual analysis by posing interpretive questions about the passage. Students should answer by annotating and noting textual evidence by underlining or highlighting.

Question 1: The article says that the inventory “represents the best available knowledge of plant experts in the state.” The inventory’s purpose is to evaluate how harmful an invasive species is by categorizing it as “High, Moderate, or Limited.” The inventory is a place to compile information from several experts on many different species and have it all in one place.

6.5(G), 6.9(A)
Definitions

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- Wildlands are public and private lands that support native ecosystems, including some working landscapes such as grazed rangeland and active timberland.
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- **High** – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- **Moderate** – These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- **Limited** – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.
Check Your Understanding

1. Now that you have read closely and worked to understand challenging portions of the text, consider how California might benefit from having the Invasive Plant Inventory. Explain in your own words why having the Inventory is a good idea.

Many people in California were involved in creating the Inventory. They identified around 200 invasive plants that are threatening the wildlands of the state. They can now keep tabs on the plants to find out if they are becoming more or less invasive over time and which plants are the most worrisome. The Inventory is a place they can keep data and use it to study the impacts on the local ecology.

Synthesizing Your Understanding

Now that you have read the passage three times and studied the vocabulary and ideas, synthesize your understanding by examining the elements of subject, purpose, and tone. Respond to the following questions as a way of bringing all your knowledge together.

1. What is the subject, or key ideas, of the text? Be as specific as you can in summarizing the subject of the editorial.

The text explains that California has an inventory, or list, of invasive plants. The list defines what non-native invasive plants are and explains how they are categorized in California according to how much they negatively impact the ecosystem.

2. What is the purpose of the text? What message did the author want to communicate to the reader or do a result of reading the text?

The text is written to describe, explain, and inform readers about the Invasive Plant Inventory. The author wants to inform readers so they can understand how the council defined and categorized invasive plants.

3. Tone describes the attitude of the author about the subject. What tone does the author create in the text? Support your inference with examples from the text, using a logical analysis of the author's tone.

The author takes an objective tone to describe the Inventory, how it was created, and the categories used to rate invasive plants. The article is not persuasive but merely explains the Inventory rather than making an argument about whether invasive plants are a problem. The author uses factual, unemotional language to objectively deliver information about the Inventory.

Writing Prompt: Based on your current understanding of the passage, explain how California is affected by invasive species that are categorized as Limited. Be sure to:
• Write a topic sentence that explains what “Limited species” means and how they impact California.
• Identify the subject, purpose, and tone, and paraphrase the information in the passage.
• Provide several pieces of text evidence that help explain the impact of invasive species.

Possible topic sentences:
• Invasive plants categorized as Limited are those that have a minor impact on the ecology or those that are in a contained area and spread slowly.
• Although an invasive plant that is categorized as Limited does not do as much damage as one categorized as High, even Limited plants should be monitored because they are concerning to the ecology.

Check Your Understanding (continued)

11 Check Your Understanding:
This requires students to think of the overall purpose for the text and its implications. Remind students to consider author’s purpose when thinking about the benefits of an invasive species inventory.

12 Synthesizing Your Understanding:
These questions provide an opportunity for students to bring together all their thinking about the passage. Remind students of the literary terms subject, purpose, and tone, and review their definitions with students as a class.

13 First, you might ask students to write the answers to the follow-up questions about subject, purpose, and tone independently or in pairs, then share as a whole class. Be sure to lead the class in a whole-group discussion to monitor their understanding.

ASSESS

Assess students’ mastery of skills by examining their writing prompts. Ensure that students have a correct understanding of the term “Limited” as it is used to describe invasive plants. Students should explain that even though species identified as Limited may be in only a small area or do not currently impact the environment, they can still pose a problem, especially if they are not managed. Be sure students use textual evidence to support their ideas.

ADAPT

If students need additional support, consider letting students work in small groups to gather and paraphrase all the information in the text about Limited invasive species. Have groups work together to summarize the information. Then let students use that information to complete their own writing prompts.