

Revisiting the Graphic Organizer and Lesson Planning Template

Activity 4.13

Using formative evidence during instruction requires planning both the strategies you will use to collect evidence and the various ways that you might use the evidence to address a range of student learning needs. This eReader includes a sample Graphic Organizer and a Lesson Planning Template for a high school science lesson on DNA along with three brief videos. These sample materials highlight the kinds of thinking a teacher can do in advance to anticipate a range of responses students might have during a lesson and plan how to respond to students at each point along the learning continuum.

Part 1 – Graphic Organizer

In this Graphic Organizer, pay attention to the fourth column, where the teacher outlines how to interpret and use the evidence that is collected. This is the final aspect of planning formative assessment lessons. Many teachers report that the use of the Graphic Organizer, while time consuming to develop the first few times it is used, dramatically improves their ability to respond quickly and effectively to evidence as it arises during a lesson. Teachers also tell us that this tool helps them think differently about their instructional planning. As you review this completed organizer, think about how this teacher will be prepared to support a range of student needs during this lesson.

Learning Goal	Success Criteria I can...	Formative Assessment Strategy (How to Elicit Evidence)	How to Interpret and Use Evidence
<i>Understand how the <u>structure</u> of DNA relates to its <u>function</u>.</i>	<i>Describe the structure of DNA.</i>	<i>Students describe observations of an animation using key terms.</i>	<i>May need to model this depending on what students are saying.</i>
	<i>Define the terms structure and function.</i>	<i>Write S or F on whiteboards in response to descriptions of either structure or function of familiar object.</i>	<i>Select students to explain response. Questions: Do others agree/disagree/why?</i>
	<i>Explain why base pair rule means DNA forms complementary strands and a double helix.</i>	<i>Explanations from pairs as they make and label DNA model. Probing question: Can you tell me why A and T bases form complementary pairs but A and C do not?</i>	<i>Explain base pair rule, how it forms complementary strands. Question: Why does DNA then form a double helix?</i>
	<i>Demonstrate the process of transcription.</i>	<i>Pairs model how DNA is transcribed into RNA.</i>	<i>Select samples of pairs with different models for peer feedback. Note: Essential to focus on accuracy.</i>
	<i>Use a Codon chart to select correct amino acids given the RNS codon triplet.</i>	<i>Read codon triplets aloud; students write amino acid equivalent on whiteboards.</i>	<i>May need to tell what the equivalents are.</i>

Learning Goal	Success Criteria I can...	Formative Assessment Strategy (How to Elicit Evidence)	How to Interpret and Use Evidence
Understand how the <u>structure</u> of DNA relates to its <u>function</u> .	Demonstrate the process of translation.	Pairs model how RNA is translated into polypeptide/protein. Questioning/modeling: Students work through a set of scaffolded questions and tasks that provide practice for transcription and translation.	Select samples of pairs with different models to share with class for peer feedback. Note: Essential to focus on accuracy.
	Use a DNA sequence (structure) to construct a polypeptide/protein (function). Explain how a mutation (change in the DNA base sequence) may or may not alter the function of a protein.	Write a paragraph explaining how changing the base sequence of DNA may or may not cause a functional change.	Use prompts during the modeling to assist students in generating the correct DNA base sequence of a complementary strand from a short polypeptide. Depending on responses, possible questions to support thinking: <ul style="list-style-type: none"> • How might a change in one base in the DNA sequence change the amino acid sequence in a polypeptide? • How could this affect the cell structure or activity? • Why might a change in the DNA base sequence not alter a cell's structure or activity? Peer feedback.
	Read about a mutation and summarize the content referring to the structure and functions of DNA and how they are related.	Individually, draw and label the DNA sequence described in the text, in the unmutated and mutated form. Write a summary, using textual information, explaining how the two types of DNA produce different functions in a cell.	Provide oral feedback to class on drawings. Comment marker feedback on summary: <ul style="list-style-type: none"> • Underline correct information. • Wavy line to go back to text and reread because information is not accurate or something is missing from the summary. • Line above where effective use of textual evidence. • Letter T where more textual evidence is needed.

Part 2 - Lesson Planning Template

As you review the sample Lesson Planning Template below, you will notice the teacher has adapted the template to include key elements required in her district planning. You may notice that this template includes "Big Ideas" and "Key Terms." You may also notice that some elements introduced in this course are not included. We anticipate many of you will adapt and refine these planning tools to meet your own needs, as this teacher has done.

Standards	<ul style="list-style-type: none"> • NGSS: <i>Disciplinary Core Idea: LSA: Structure and Function</i> <i>Crosscutting Concepts: Structure and Function.</i> • CCSS ELA: <i>WHST9-12.9; RST11-12.1</i>
Big Idea	<p><i>DNA is a warehouse of the genetic code that provides information that controls cellular structure and activities.</i></p>
Relevant Prior Knowledge	<p><i>Proteins are macromolecules made of specific sequences of amino acids (<u>structure</u>). Proteins have many <u>functions</u> that control cellular structure and activities.</i></p>
Time	<p><i>3 blocks of 90 minutes.</i> <i>Success criteria for each 90 minute block will be shared at the beginning of the block.</i></p>
Learning Goal(s)	
<p><i>Understand how the <u>structure</u> of DNA relates to its <u>function</u></i></p>	<p><i>I can:</i></p> <ul style="list-style-type: none"> • <i>Define the terms structure and function.</i> • <i>Describe the structure of DNA.</i> • <i>Explain why base pair rule means DNA forms complementary strands and a double helix.</i> • <i>Demonstrate the process of transcription.</i> • <i>Use a Codon chart to select correct amino acids given the RNS Codon triplet.</i> • <i>Demonstrate the process of translation.</i> • <i>Use a DNA sequence (<u>structure</u>) to construct a polypeptide/protein (<u>function</u>).</i> • <i>Explain how a mutation (change in the DNA base sequence) may or may not alter the function of a protein.</i>

Possible Misconceptions/Confusions:

- Mix up structure and function terms.
- Make complementary strands parallel rather than anti-parallel.
- Mix up base pair rule.
- Confusion about why A and T are complementary but not A and C.
- Difficulty using the RNA triplet Codon chart.
- Using T instead of U in RNA, using U instead of T in DNA, transcribing T to U not A.
- All mutations are BAD!!
- All mutations cause a change in the protein structure.

Key Terms to Listen For

Structure, function, double helix, anti parallel, complementary, base rungs, sugar/phosphate sides, H-Bonds, transcription, translation, codons, RNA, A, C, T, G, U, anti-codon, ribosome, polypeptide, mutation.

Other Questions to Extend Thinking

- (1) What do you think are some of the pros and cons of cells having DNA in the form of a double helix rather than a single strand?
- (2) What do you think are some of the pros and cons of cells having DNA in the nucleus rather than loose in the cytoplasm?
- (3) What are some of the evolutionary inferences you could hypothesize about DNA based on its structure?

Self-Assessment

At the end of each block students respond to three questions using post-it notes:

- Green - Did you meet the success criteria today?
- Red - What problems did you have in the lesson?
- Yellow - How can you address the problems (help from teacher/peers)?

Part 3 – Planning in Action: Examples of Evidence Collection, Interpretation, and Use

Each of these three brief videos highlights ways in which teacher planning informs quick and seamless response to student evidence.

As you watch each video, notice:

- (1) What strategies the teacher uses to collect evidence (Column 3 in the Graphic Organizer), and
- (2) What strategies the teacher uses to respond to evidence (Column 4 in the Graphic Organizer).

The links below will take you to the Teaching Channel website to view the videos.



Adjusting Lessons: Have a Plan B (2:29)

<https://www.teachingchannel.org/videos/teacher-backup-plans>



Text What You Learned: Using Technology to Assess (1:43)

<https://www.teachingchannel.org/videos/texting-to-assess-learning>



Assess and Plan with Exit Tickets (2:17)

<https://www.teachingchannel.org/videos/teacher-assessment-strategy>