Middle school course curriculum structure

Middle School Curriculum New York City Edition

Grade 6

- Launch: Harnessing Human Energy
- Thermal Energy
- Populations and Resources
- Matter and Energy in Ecosystems
- Weather Patterns
- Ocean, Atmosphere,and Climate
- Earth's Changing Climate

Grade 7

- Launch: Microbiome
- Metabolism
- Phase Change
- Chemical Reactions
- Plate Motion
- Engineering Internship: Plate Motion
- Rock Transformations
- Engineering Internship: Earth's Changing Climate

Grade 8

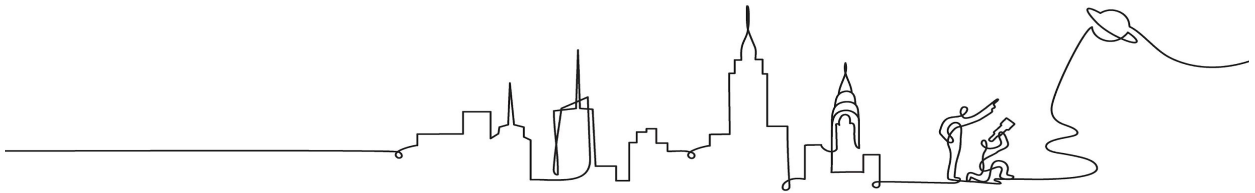
- Launch: Geology on Mars
- Earth, Moon, and Sun
- Force and Motion
- Engineering Internship: Force and Motion
- Magnetic Fields
- Light Waves
- Traits and Reproduction
- Natural Selection
- Evolutionary History

Welcome to Amplify Science!

Follow the directions below as we wait to begin.

1. Please log in to your Amplify Account.

2. In the chat, share your name, school, your most current instructional context (remote/hybrid/in-person), & how many years you've been teaching Amplify Science.
   (Example: Reshma, H, 2)

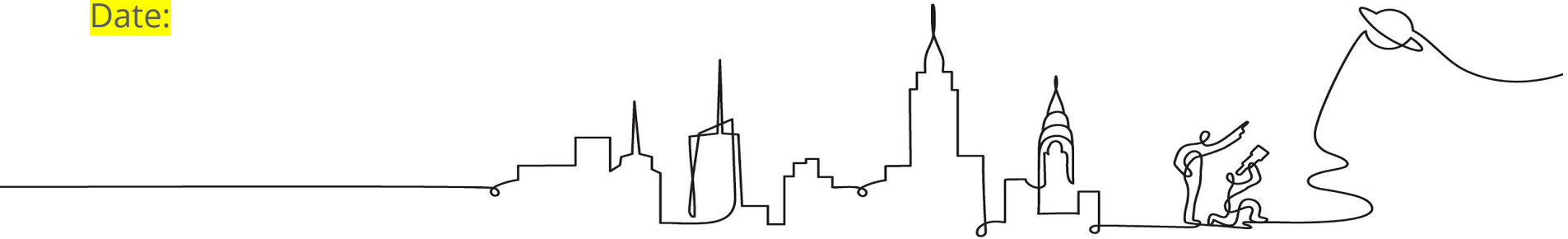


Amplify Science
New York City

Amplify Science Planning for Next Year

8th grade teacher session

Presenter Name:
Date:



Remote Professional Learning Norms

Take some time to orient yourself to the platform

- *"Where's the chat box? What are these squares at the top of my screen?, where's the mute button?"*

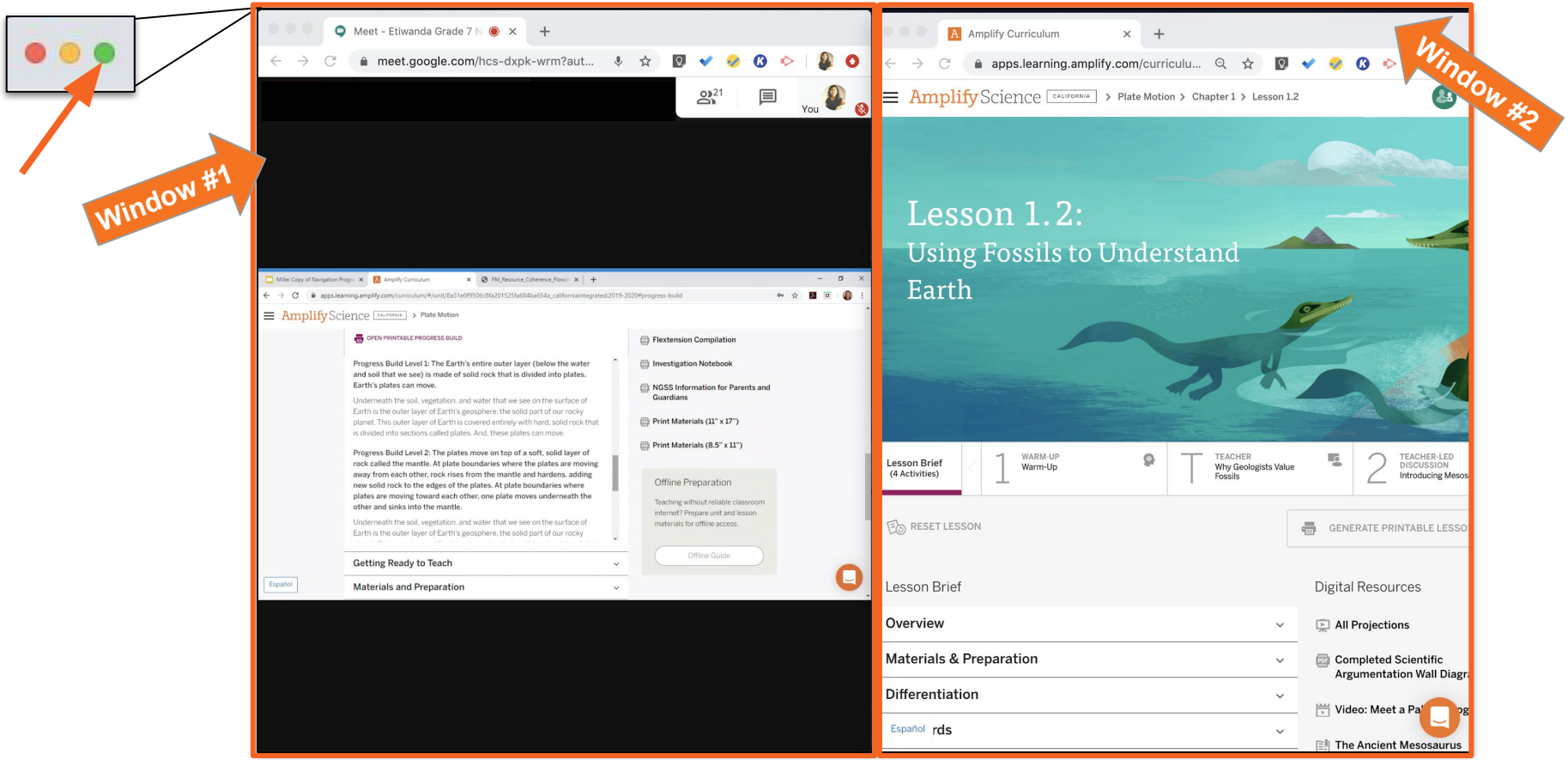
Mute your microphone to reduce background noise unless sharing with the group

The chat box is available for posting questions or responses to during the training

Make sure you have a note-catcher present

Engage at your comfort level - chat, ask questions, discuss, share!

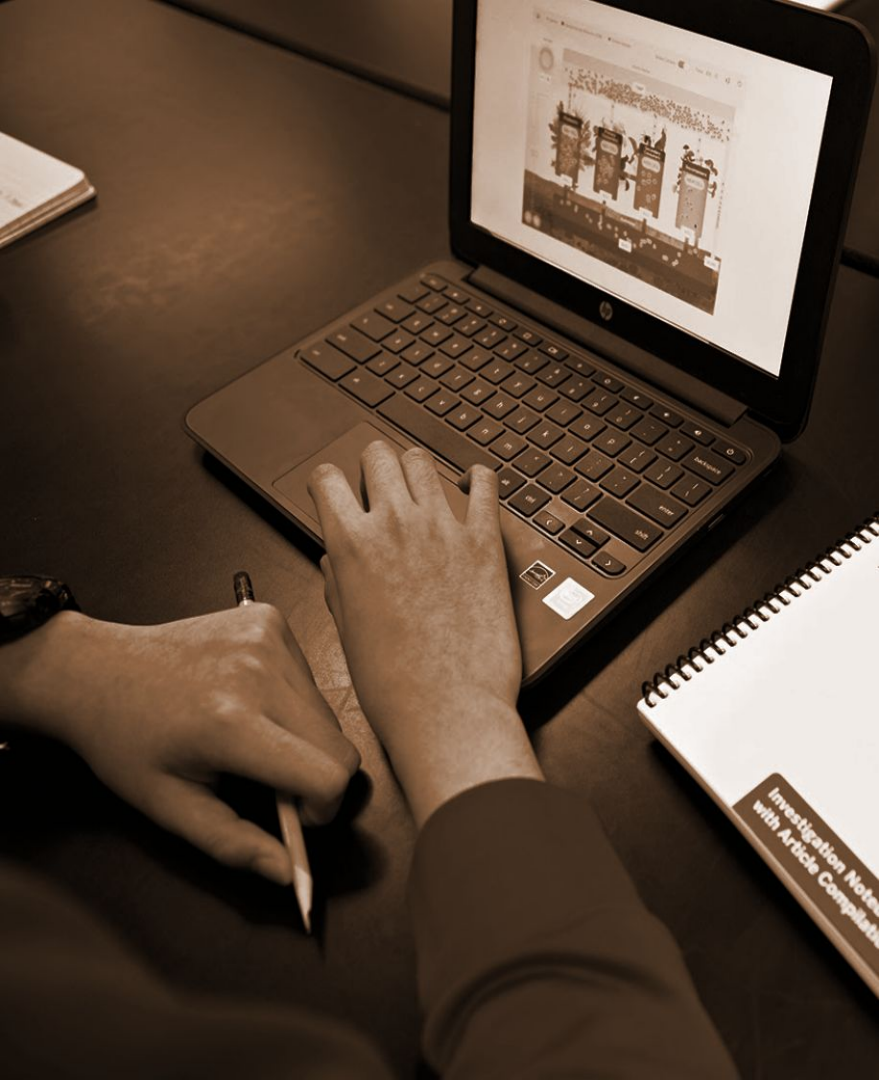
Use two windows for today's webinar



Overarching goals

By the end of this 3-hour workshop, you will be able to:

- Reflect on your implementation of Amplify Science in the targeted areas of digitally-enhanced learning, supporting diverse learners, & disciplinary literacy.
- Utilize these reflections to begin targeted planning at the unit & lesson level for the upcoming school year.



Plan for the day

- **Framing the day**
  - **Welcome and introductions**
  - **Anticipatory activity**
- Targeted Implementation Reflection
  - Digitally-enhanced learning
    - Remote/Hybrid Resources Utilization
  - Reaching diverse learners
    - Utilizing Embedded Assessments
    - Culturally Linguistically Responsive Teaching
  - Science & Literacy
    - Accessing Complex Texts
    - Supporting Academic Discourse
    - Writing In Science
- Guided Planning
  - Unit internalization protocol
  - Chapter & Lesson-level internalization
    - Planning & pacing
- Closing
  - Reflection & additional resources
  - Survey

Anticipatory activity

Reflect & share

- Complete your **self-assessment**
- Then, on the **Jamboard**, "post" the **"I do"** statement you identify as your **greatest strength**

Page 1

Self-inventory: choosing an area of focus for planning

Directions: Use the statements to help guide your areas of strength & support for guided planning.

Statements	I don't	I try	I do
1. I can utilize **digital resources** to enhance instruction.			
2. I can administer **assessments embedded** within instruction.			
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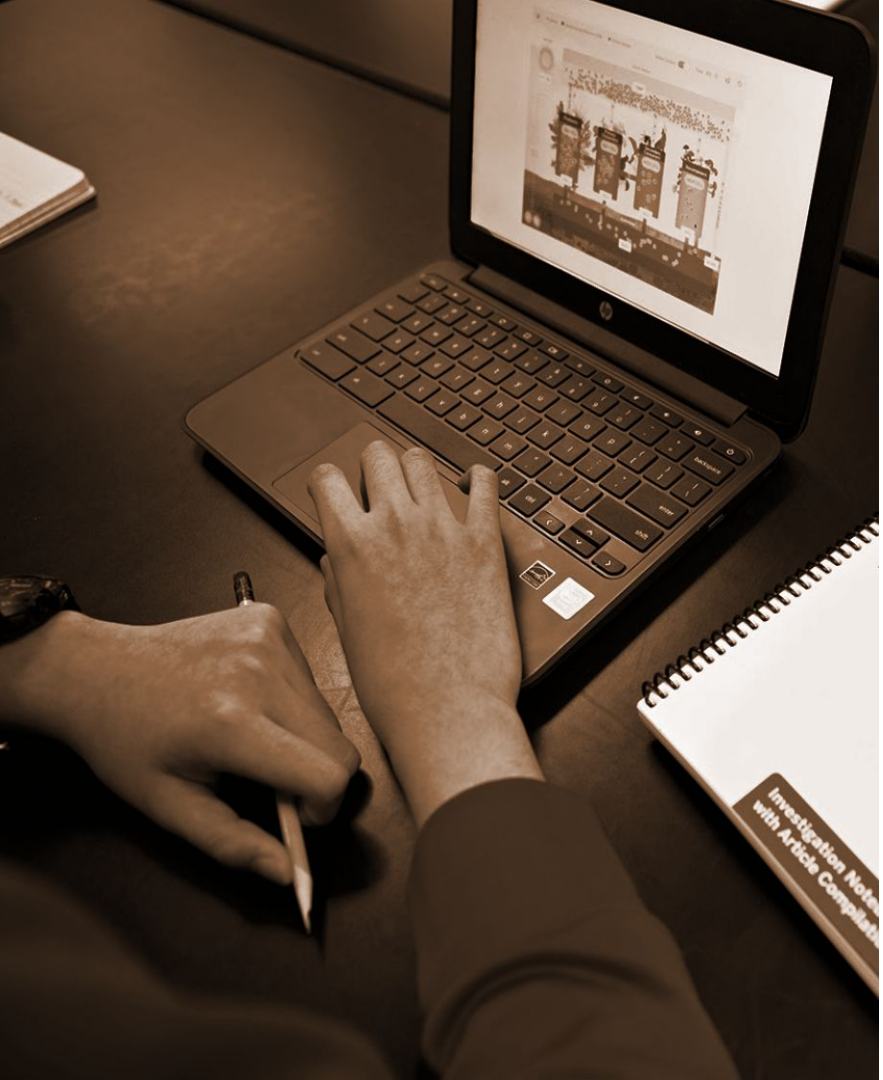
5. I can support my students in deconstructing **complex scientific texts** in order to bolster scientific understanding			
6. I can implement **discourse routines** in order to support students developing scientific understanding.			
7. I can adjust **questioning strategies** to support students' scientific inquiry.			
8. I can scaffold students writing of **scientific arguments** & explanations.			

Step #1

Jamboard

Step #2

Questions?



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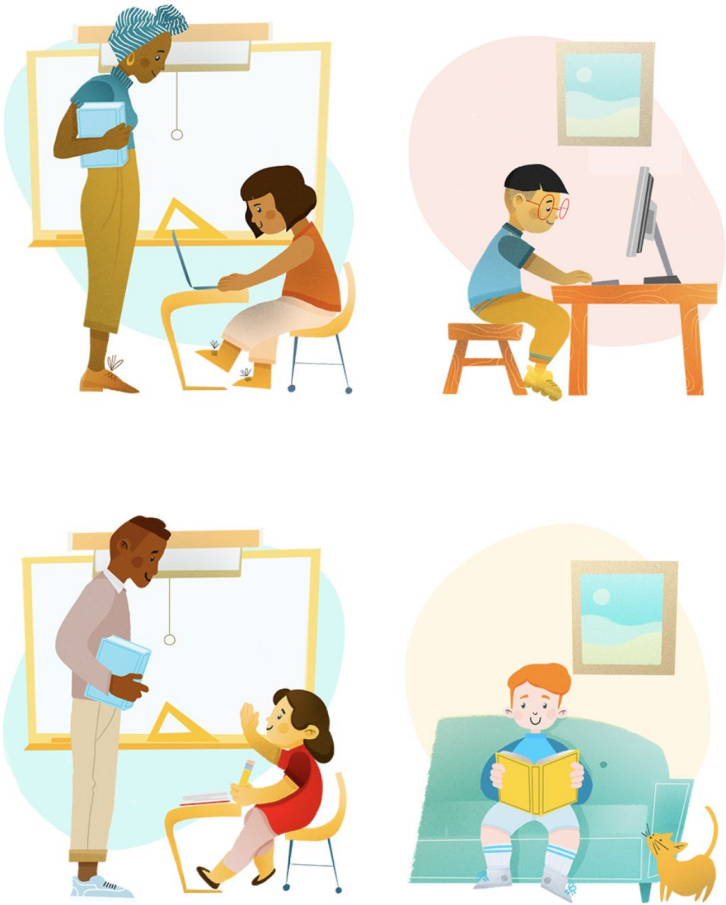
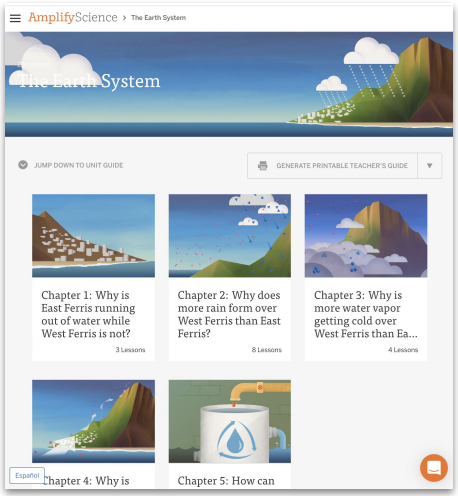
AmplifyScience@Home

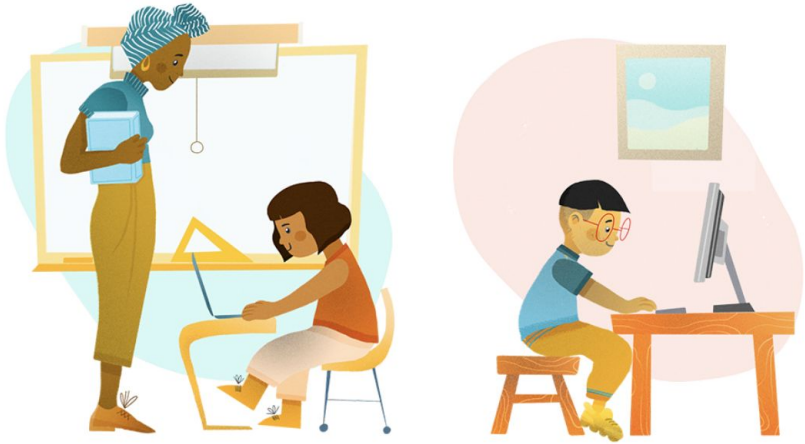
A suite of resources designed to make extended remote and hybrid learning easier for teachers and students.



Resource options



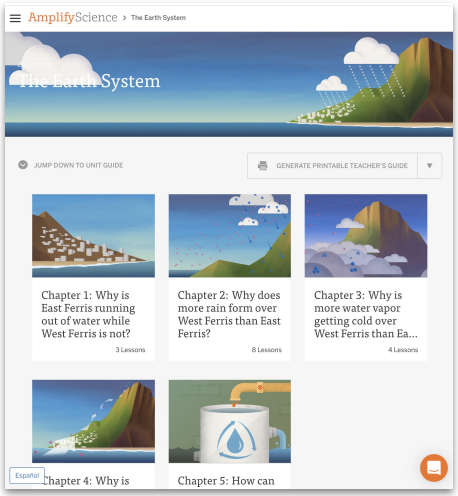
Original Amplify Science curriculum



Amplify Science@Home

Resource options

Related but unique resources



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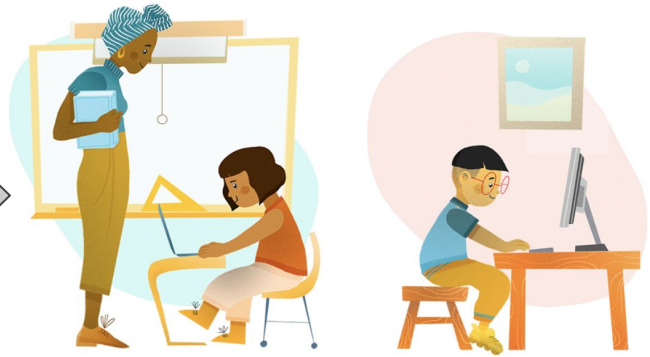
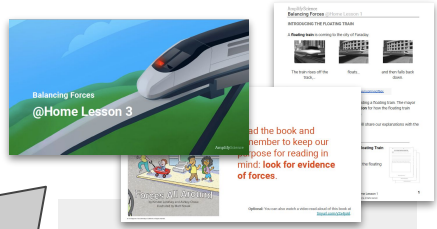
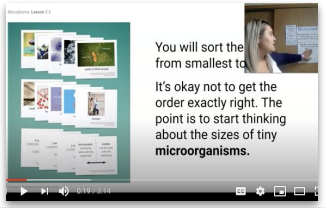


Amplify Science@Home



@Home Units



@Home Videos

Targeted reflection

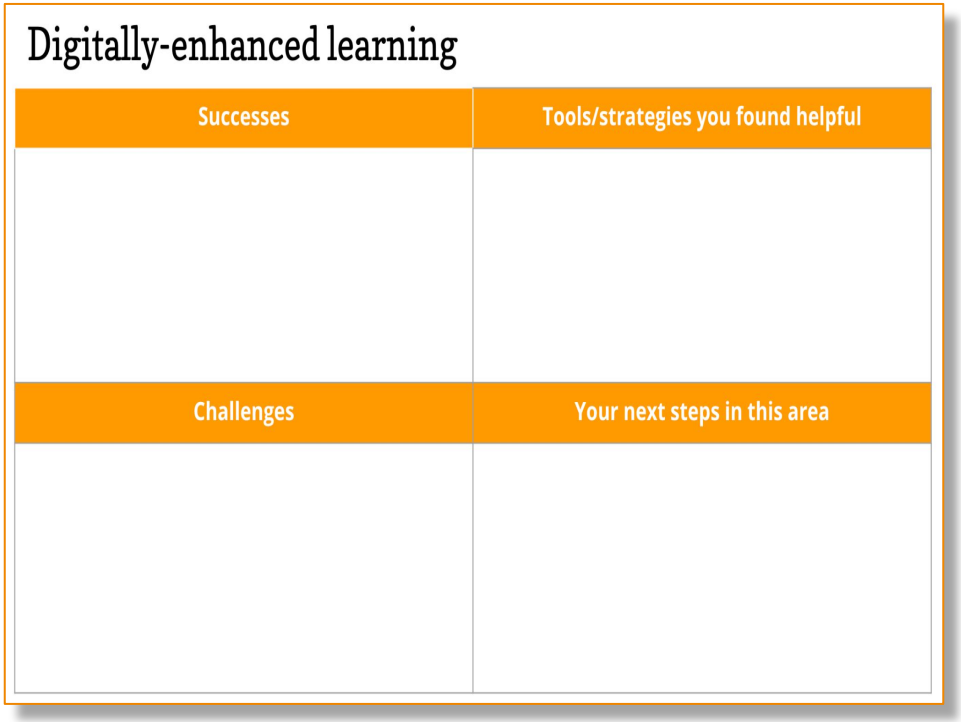
We'll reflect on each area, following this structure:

- Brief overview of area/topic
- Model activity
- Reflect & share insights

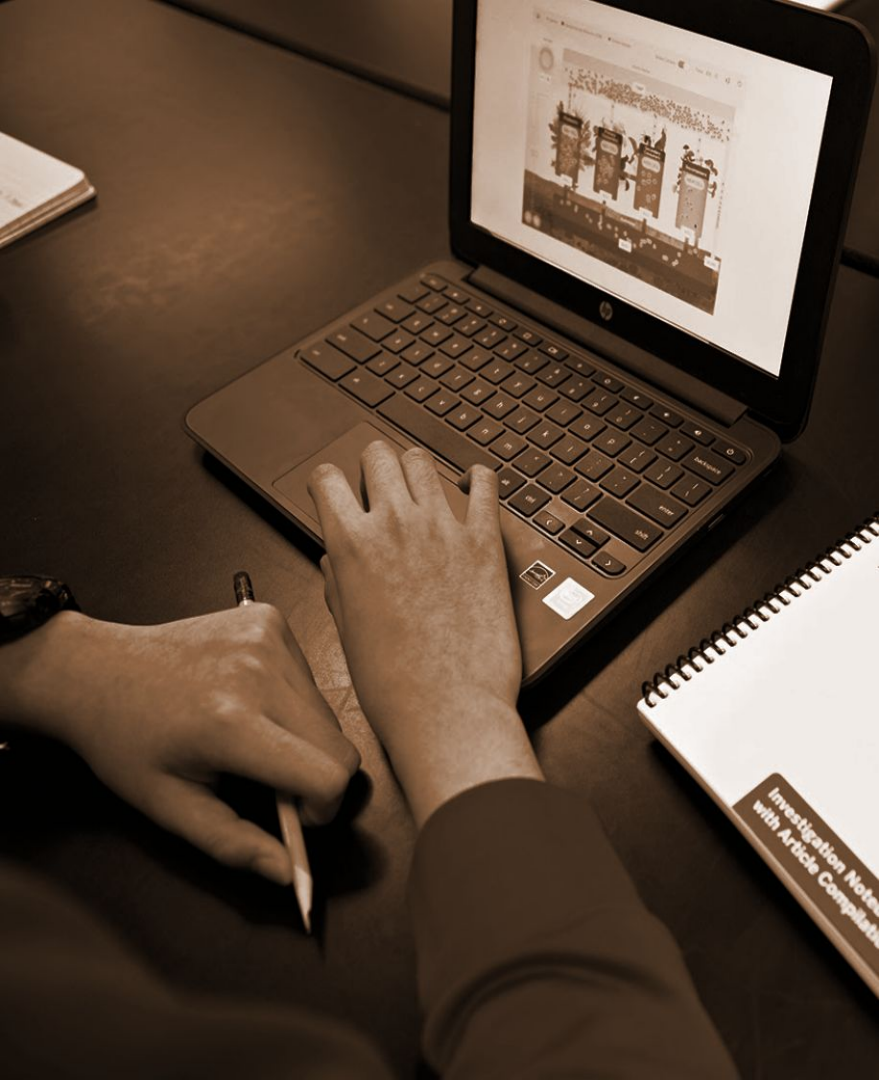
Collaborative reflection: digitally-enhanced learning

On the slides, enter:

- Successes
- Tools & strategies you found helpful
- Challenges
- Your next steps in this area



Questions?



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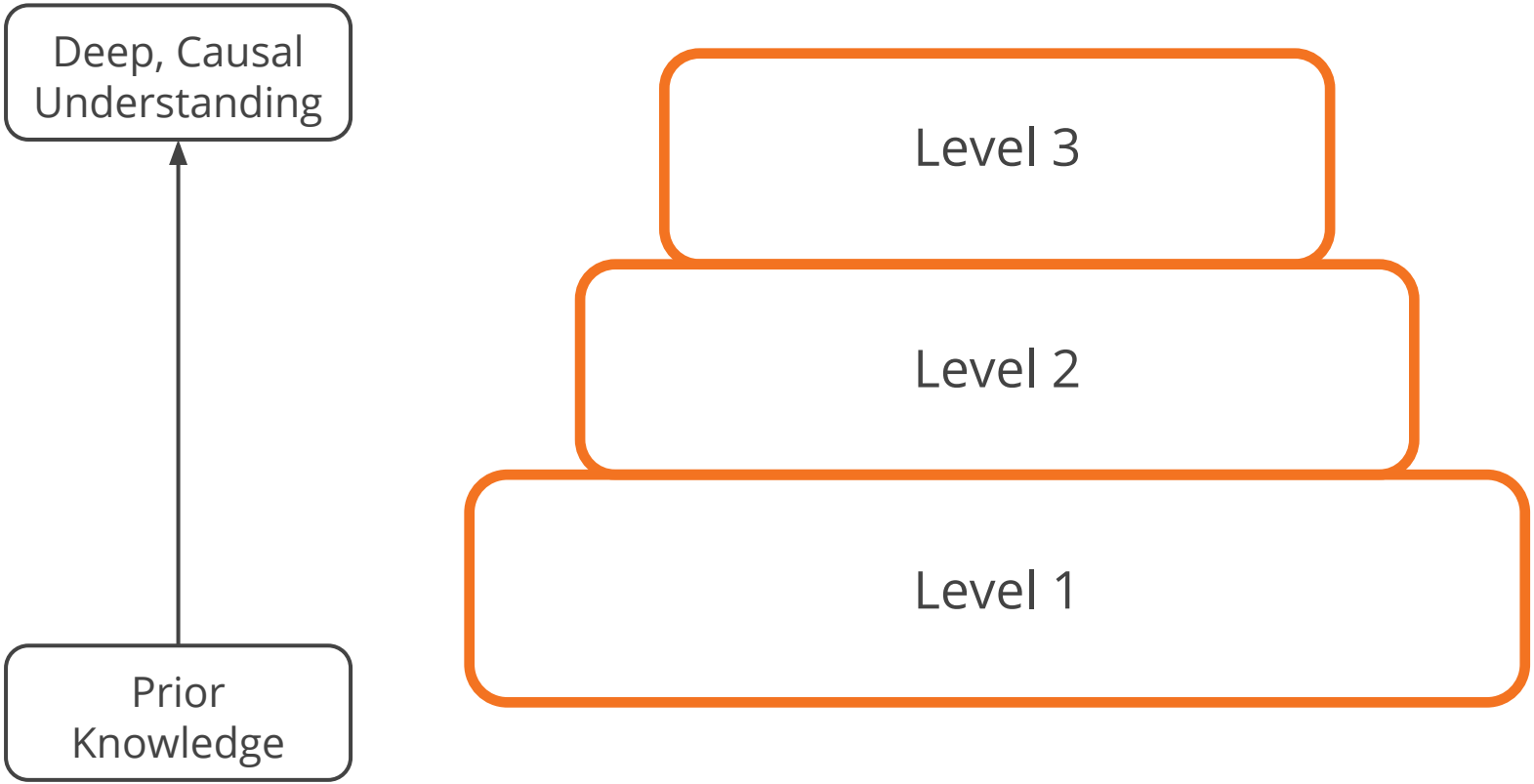
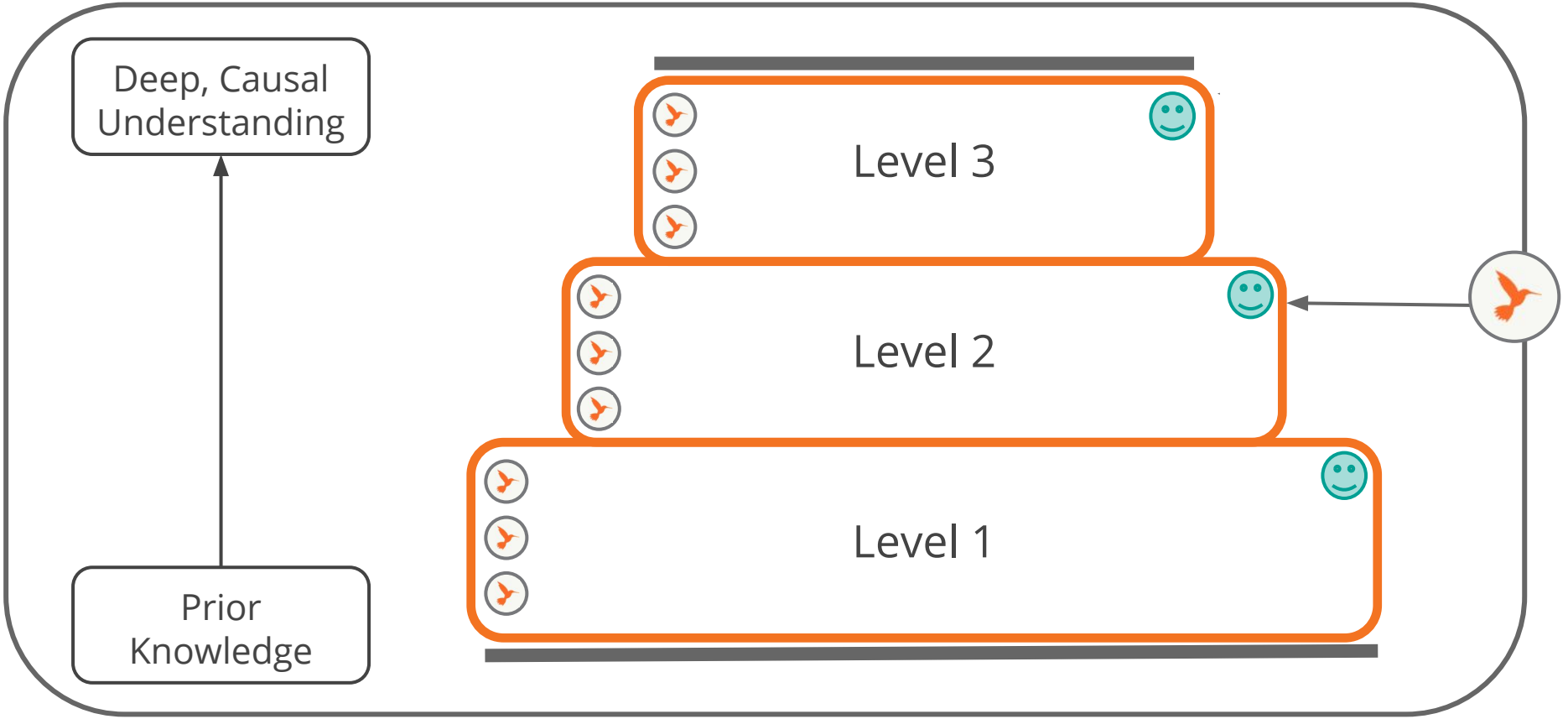
Utilizing Embedded Assessments

Progress Build: A unit-specific learning progression



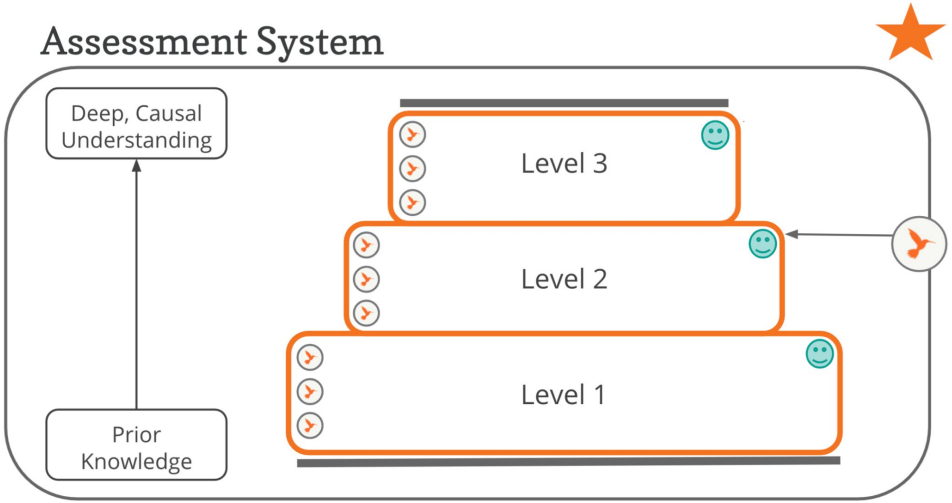
Assessment System



Assessment System Reflection

There are many assessment opportunities in each Amplify Science unit.

Question: What does having this quantity of assessment opportunities do for students? For teachers?



On-the-Fly Assessments

- Occurs throughout the lessons
- Three-dimensional tasks that span a range of modalities
- Provides evidence of how a student is coming to understand core concepts and developing dexterity with SEPs and CCCs
- Designed to help a teacher make sense of student activity during a learning experience
- Contains Look For / Now What resource for analyzing student responses

Collecting Data

How do you typically collect and record student data?

What strategies have you successfully used for collecting data in a remote learning setting ?

Data Collection Tool Sample

Lesson 1.5 Activity 3: Modeling the Relationship Between Atmosphere and Climate

Look For 1: Shows correct atmospheric trends
Look For 2: Shows trends correlate with increased surface energy absorption

(X indicates student did not demonstrate Look For.)

Student	LF1	LF2	Notes
Samya	X		CO_2 decreasing
Devon	X		High amounts of sulfur dioxide, then high amounts of methane
Iyakiel			
Dantaijia			
Samuel		X	Increasing CO_2, but decreasing energy absorption
Alexcya			
Sallie	X		Showed increasing sulfur dioxide
Nevaeh B.	X	X	Decreasing methane and decreasing energy absorption. Explanation said that the air is hotter, so the surface must be cooler.
Salvador			
Yanailis			
Michelle			
Nevaeh Y.			
Corey			
Khadijah			
Victoria			
Kalil			
Andrew			
Kai'Aisja			
Nehemiah			
Oscar			

Questions?

Culturally Linguistically Responsive Teaching

The Amplify Science curriculum was developed with supporting diverse learning needs in mind.

Two overarching conceptual frameworks informed Amplify Science's approach to ensuring access and equity for all students:

Universal Design for Learning & Culturally Linguistically Responsive Teaching.

Culturally and linguistically responsive teaching

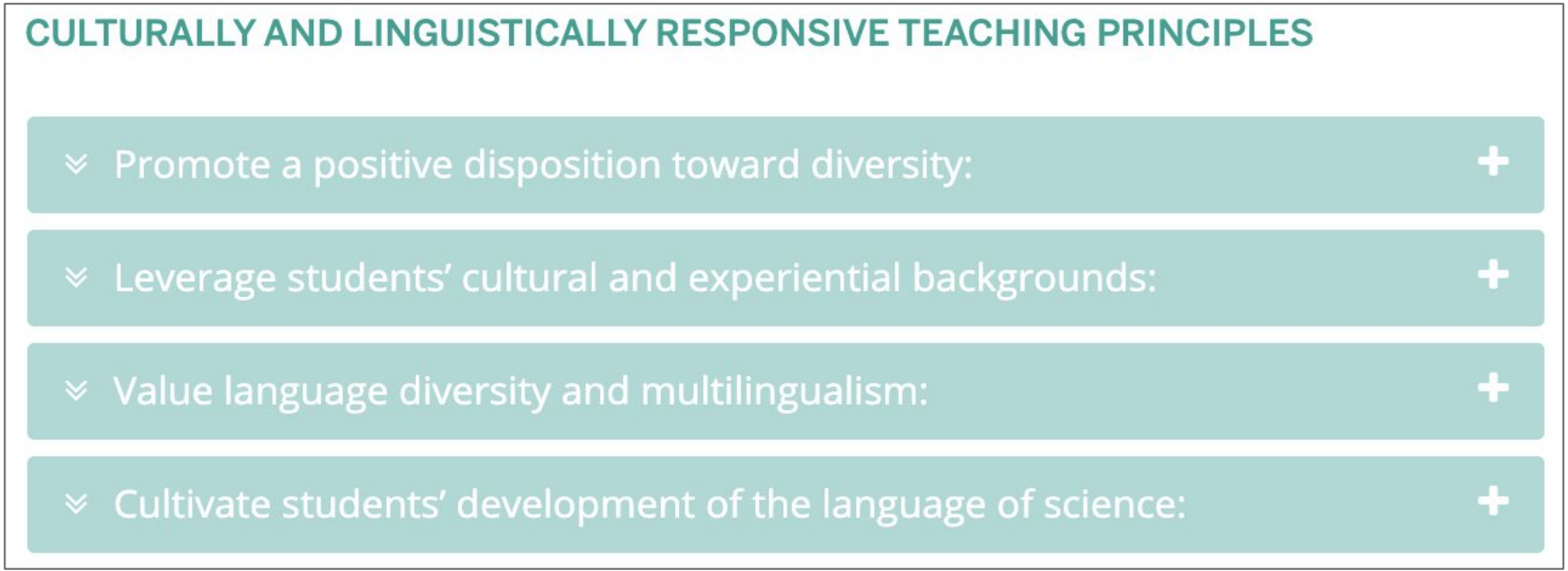
Culturally and linguistically responsive teaching (CLRT) principles **emphasize validating and valuing students' cultural and linguistic heritage** and **creating positive and nurturing learning environments** so that learning is more effective.

Source: (l): Aaron Yaazie; (um): Kyle Spradley/ University of Missouri; (lm) Dr. Grace O'Connell; (ur) Jane Rigby; (lr) Tina Shelton/ John A. Burns/ University of Hawaii at Manoa

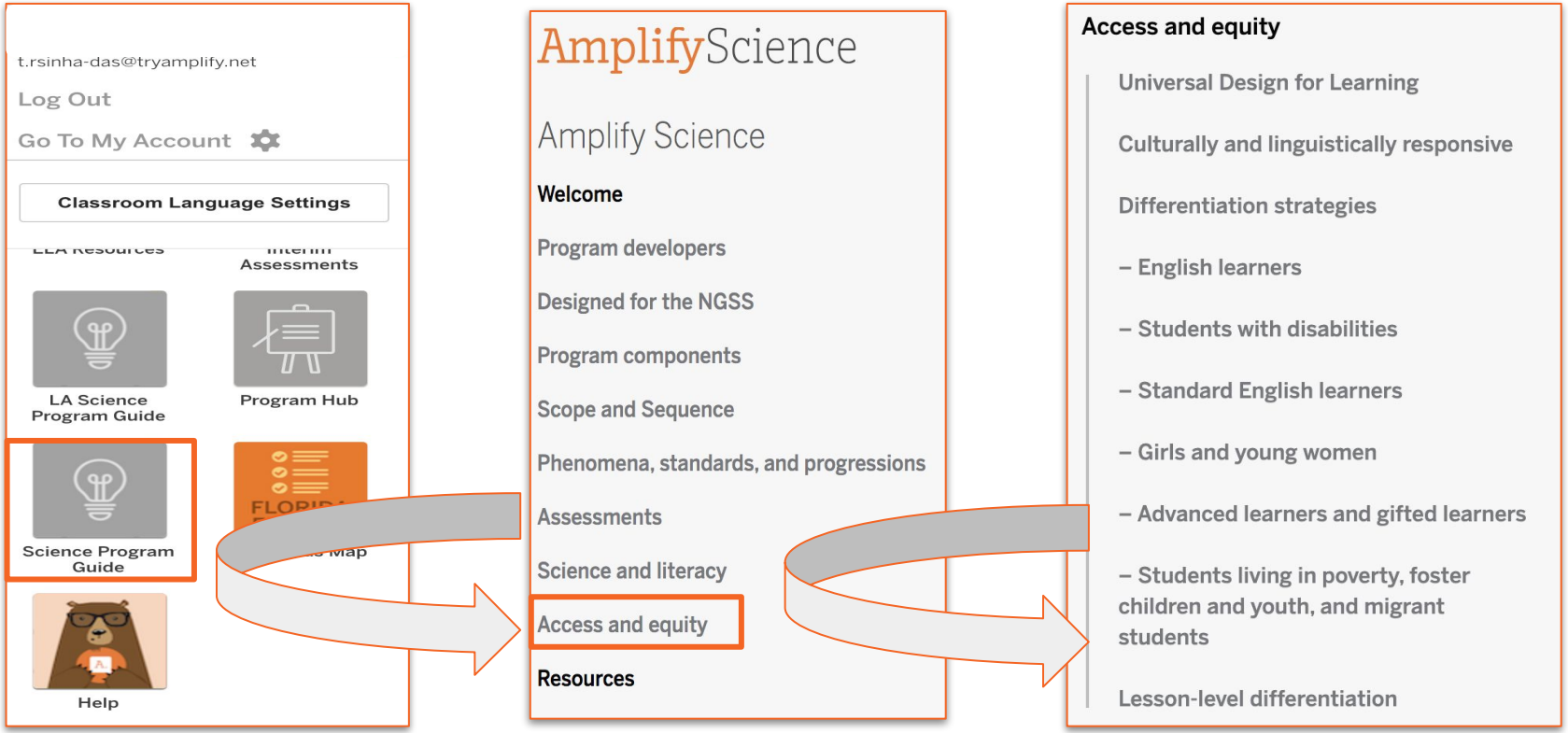
Access and Equity

Culturally and linguistically responsive teaching

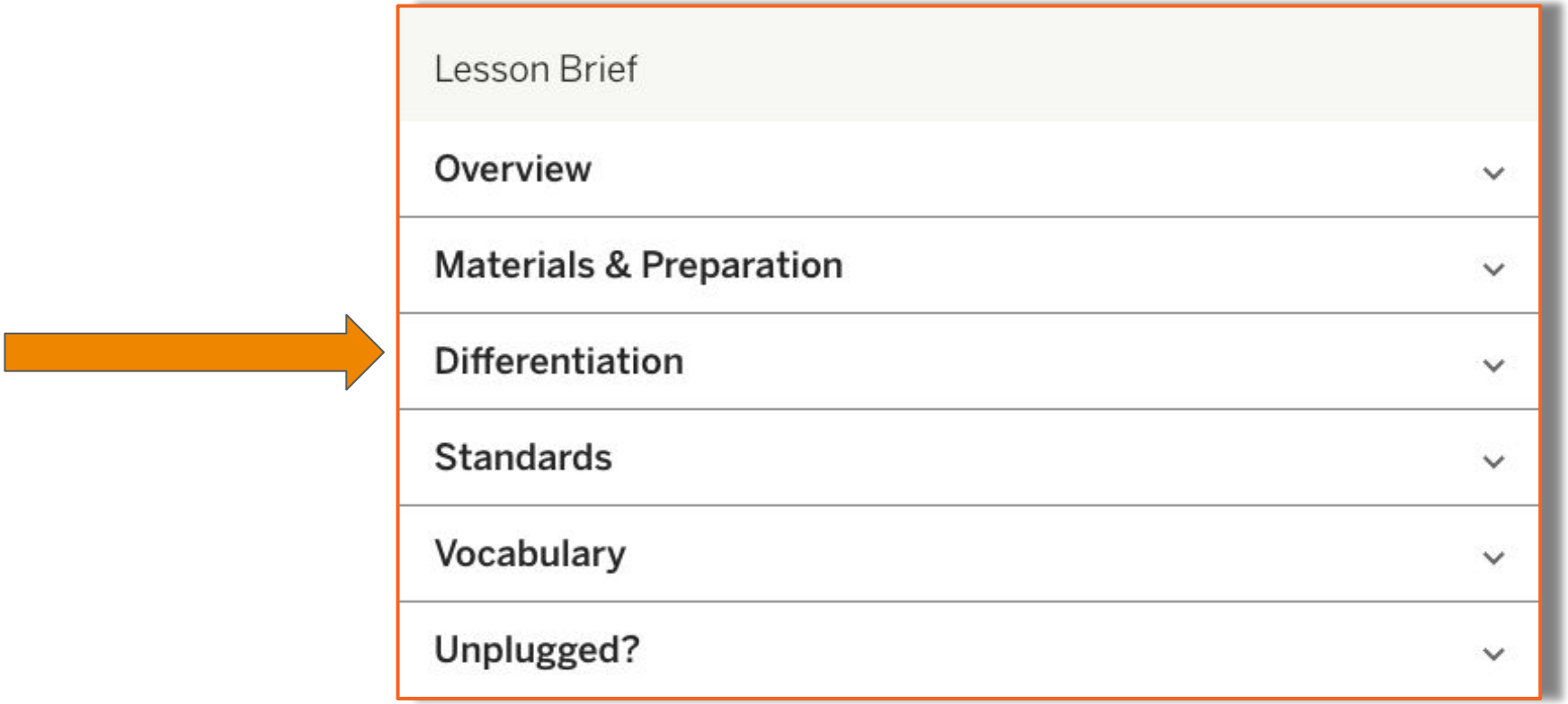
Think, type, chat: What have you leveraged from the Amplify curriculum to support culturally and linguistically responsive teaching?



Differentiation strategies to support ALL students



Differentiation in Amplify Science



Differentiation briefs

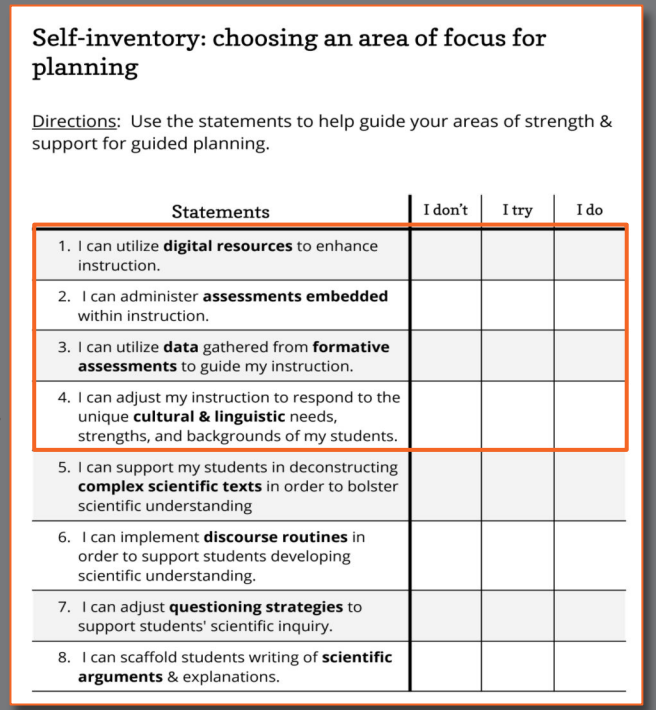
Categories of differentiation briefs

- Embedded supports for diverse learners
- Potential challenges in this lesson
- Specific differentiation strategies for English learners
- Specific differentiation strategies for students who need more support
- Specific differentiation strategies for students who need more challenge

Model activity

As you observe activity, focus on your successes, challenges, & next steps from this area of your self-inventory

1,2,3,4



Self-inventory: choosing an area of focus for planning

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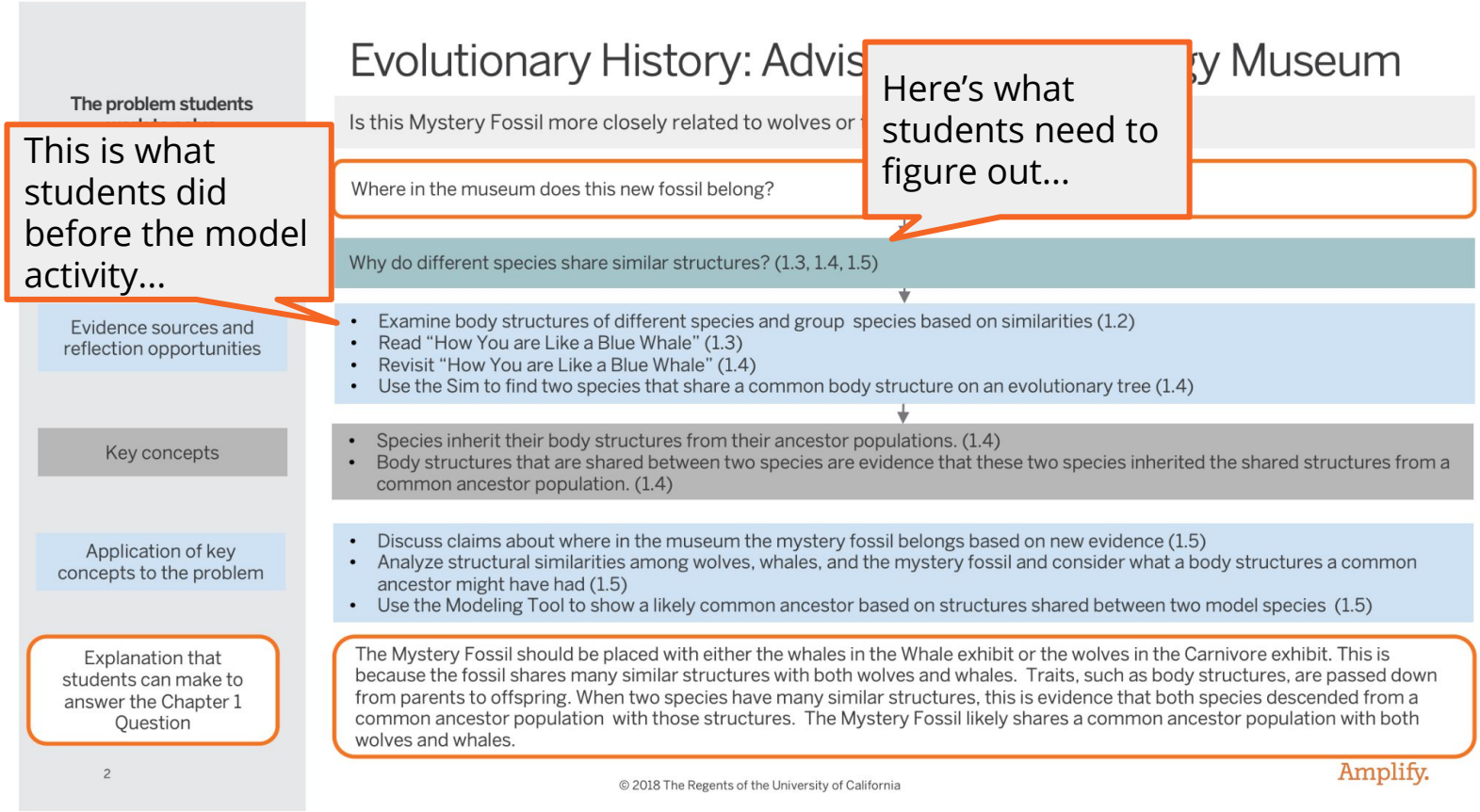
19 Lessons

Evolutionary History

Is this Mystery Fossil more closely related to wolves or to whales?

Students act as student paleontologists to discover the evolutionary history of a mystery fossil. Is this species more closely related to wolves or whales, and how did all three species change over time? Students learn how to interpret similarities and differences among fossils, they investigate how natural selection can lead to one population becoming two different species, and also investigate evolution over vast periods of time.

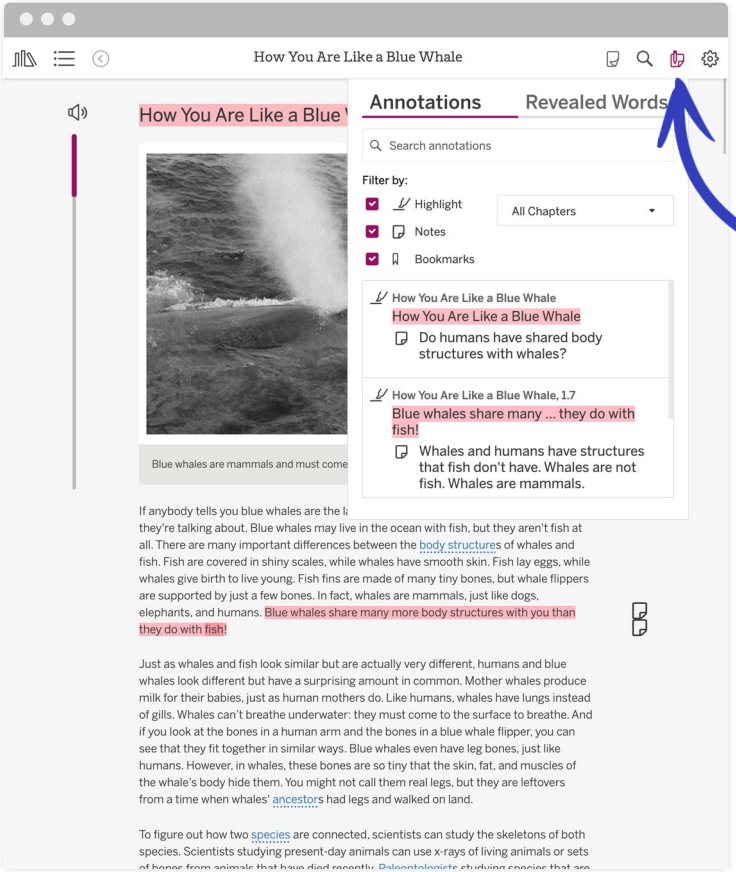


Amplify.

10 MIN

Activity 3

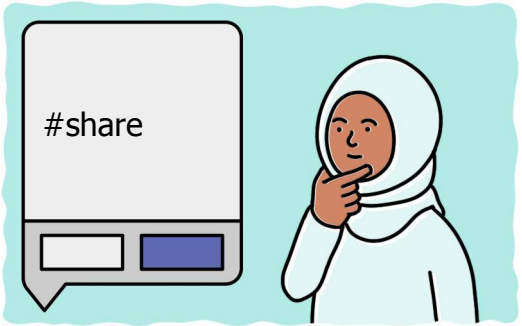
Discussing Annotations



Next, you'll look over your annotations and choose some to discuss.

Let's talk about the different hashtags you'll use to select your annotations.

Discussing Annotations



Step 1: Prepare to Share

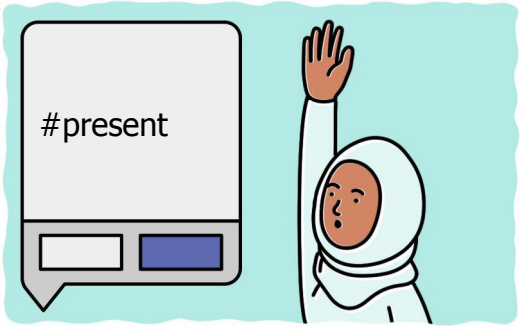
Choose an interesting question or connection to share with a partner.

Tag it with **#share.**

Step 2: Discuss

Talk about your chosen annotation with a partner.

Tag it with **#discussed** if you were able to resolve your questions.



Step 3: Prepare to Present

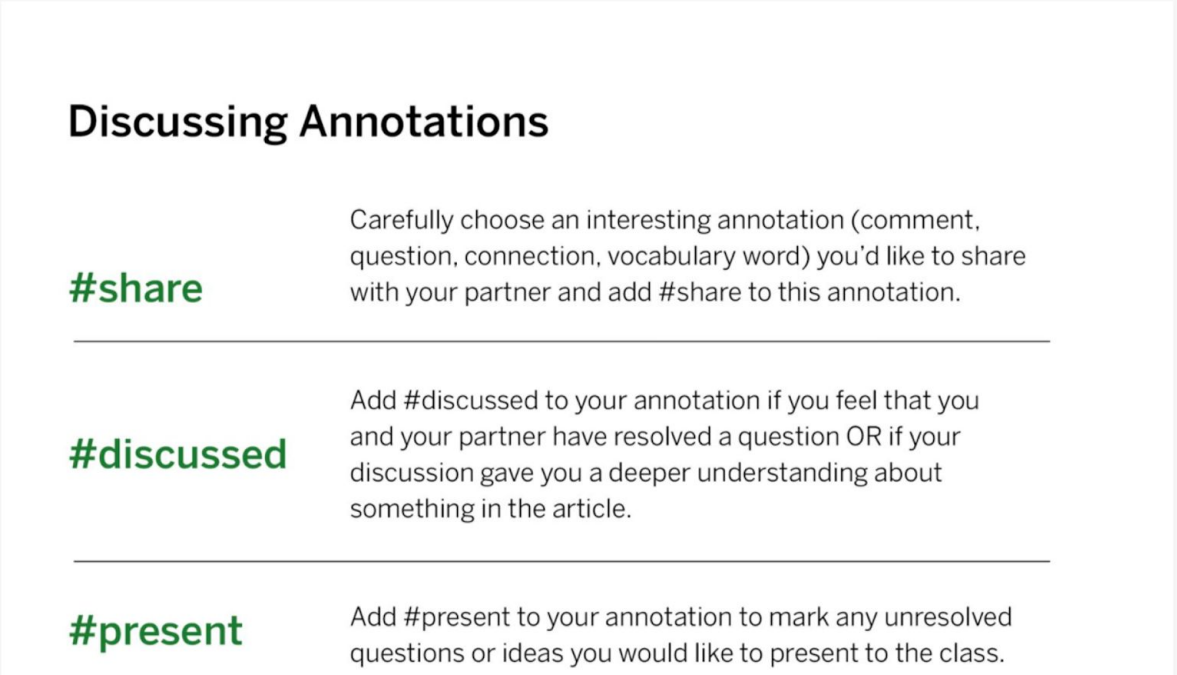
Choose an interesting idea or unanswered question to present to the class.

Tag it with **#present.**

Discussing Annotations

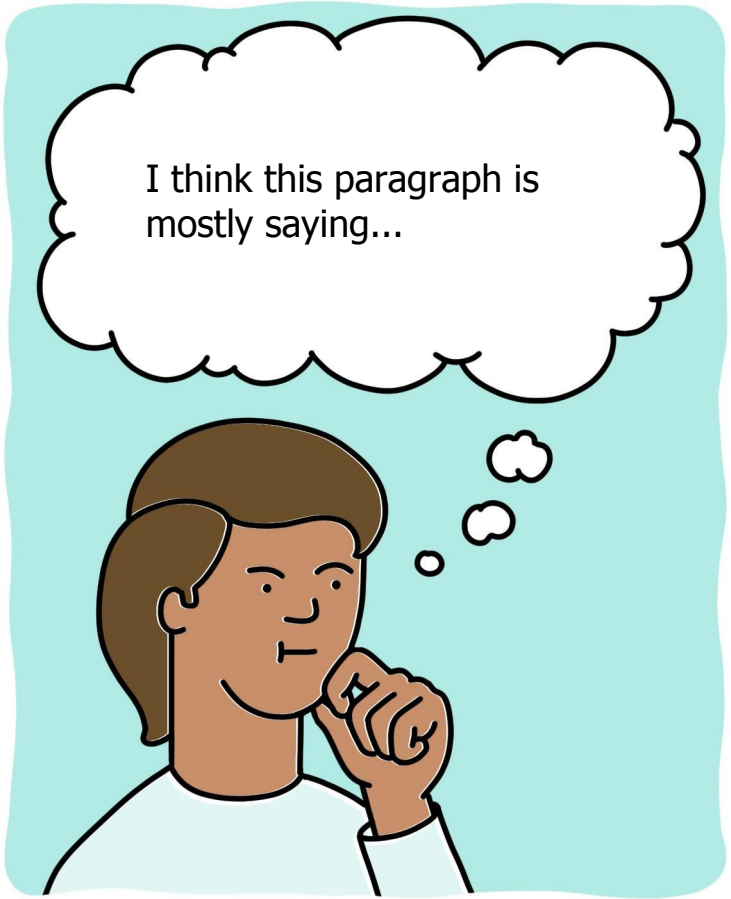
Discussing Annotations

1. Look over your annotations on the "How You Are Like a Blue Whale" article. Pick one or two of your annotations to share with a partner. Then, edit the annotations and add the tag "#share."
2. Discuss the tagged annotations with your partner. After your discussion, edit these annotations and change the tag to "#discussed."
3. Now, choose a question or



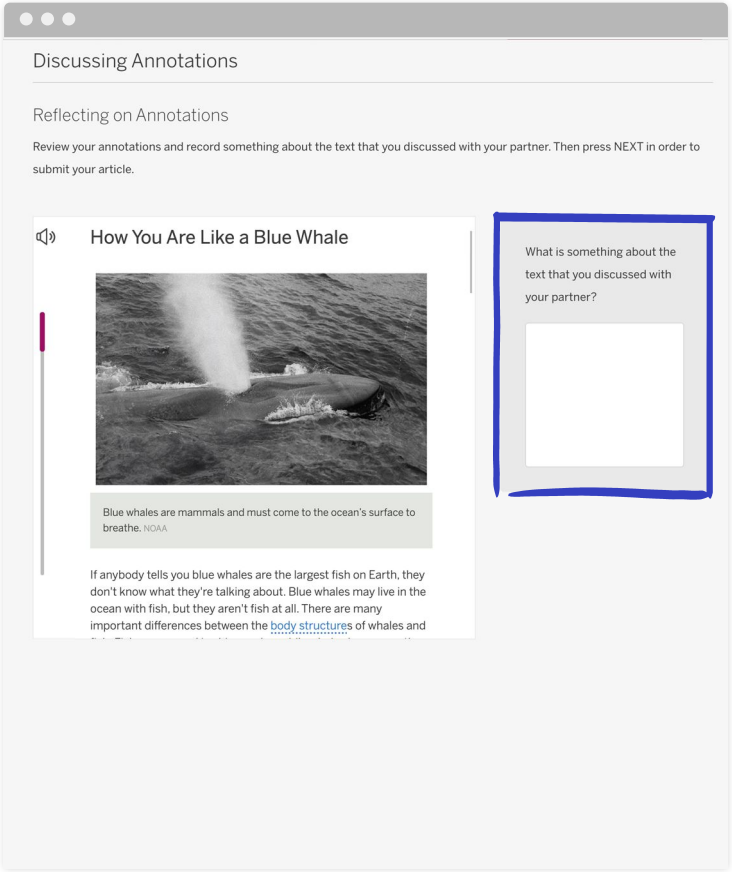
Let's discuss some of your annotations as a class.

What **connections** did you make, or what **unanswered questions** do you still have about the article?



Do you think the strategy of **summarizing** was useful?

Why or why not?



Review your annotations, and then **answer** the reflection question.

Let's discuss how the information in the article relates to our question.

Investigation Question:
Why do different species share similar structures?

Vocabulary

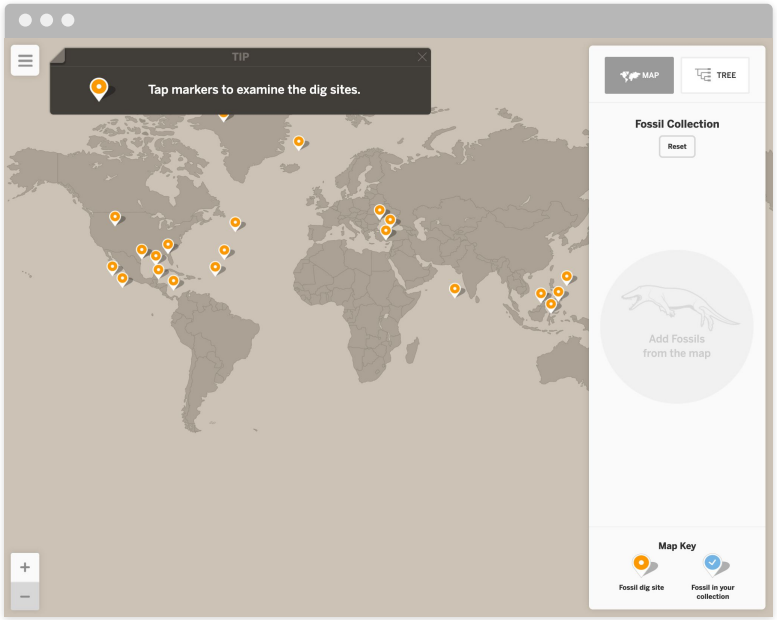
evolution

the process by which species adapt to environmental changes over a very long time

5 MIN

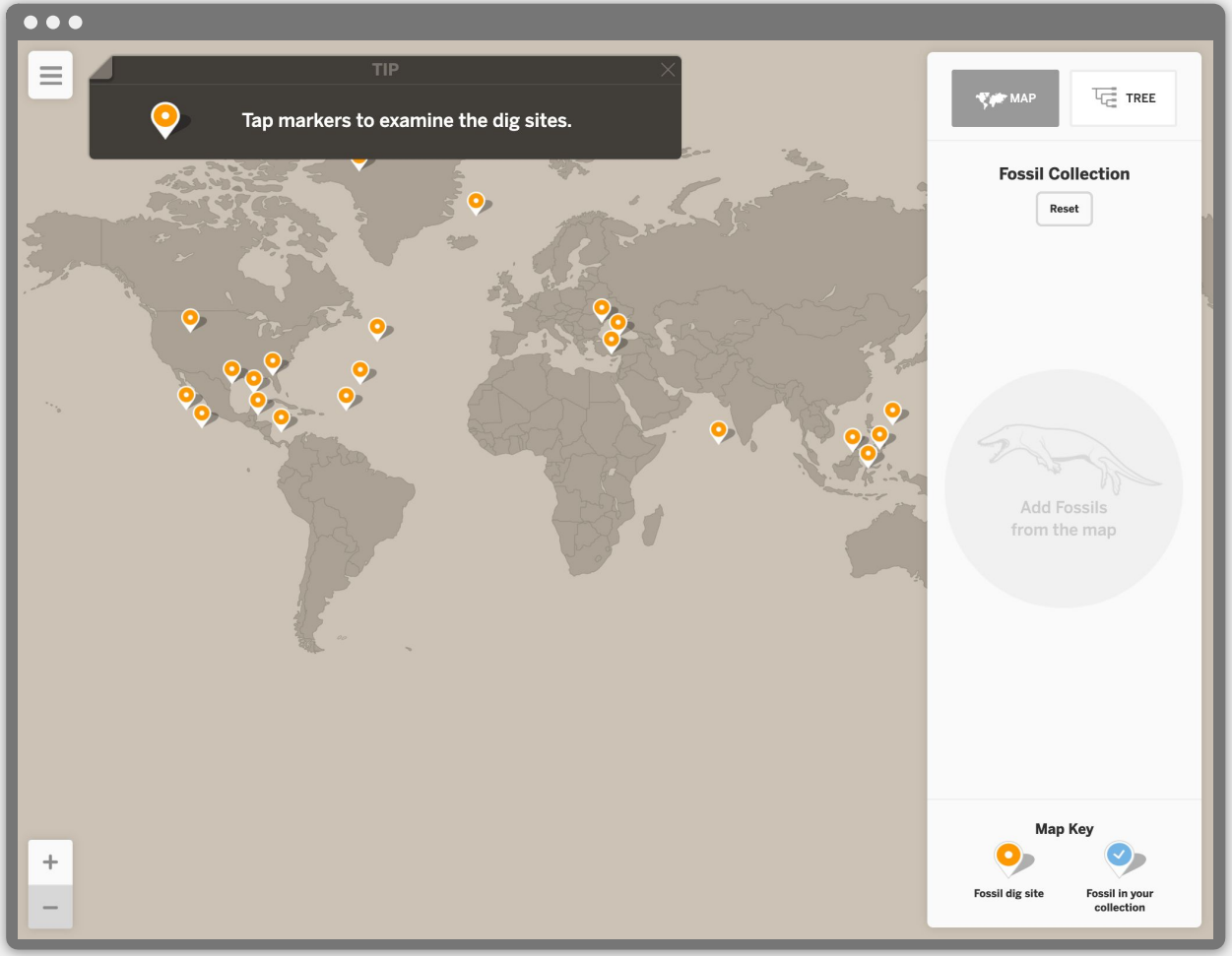
Activity 4

Introducing the Evolutionary History Simulation

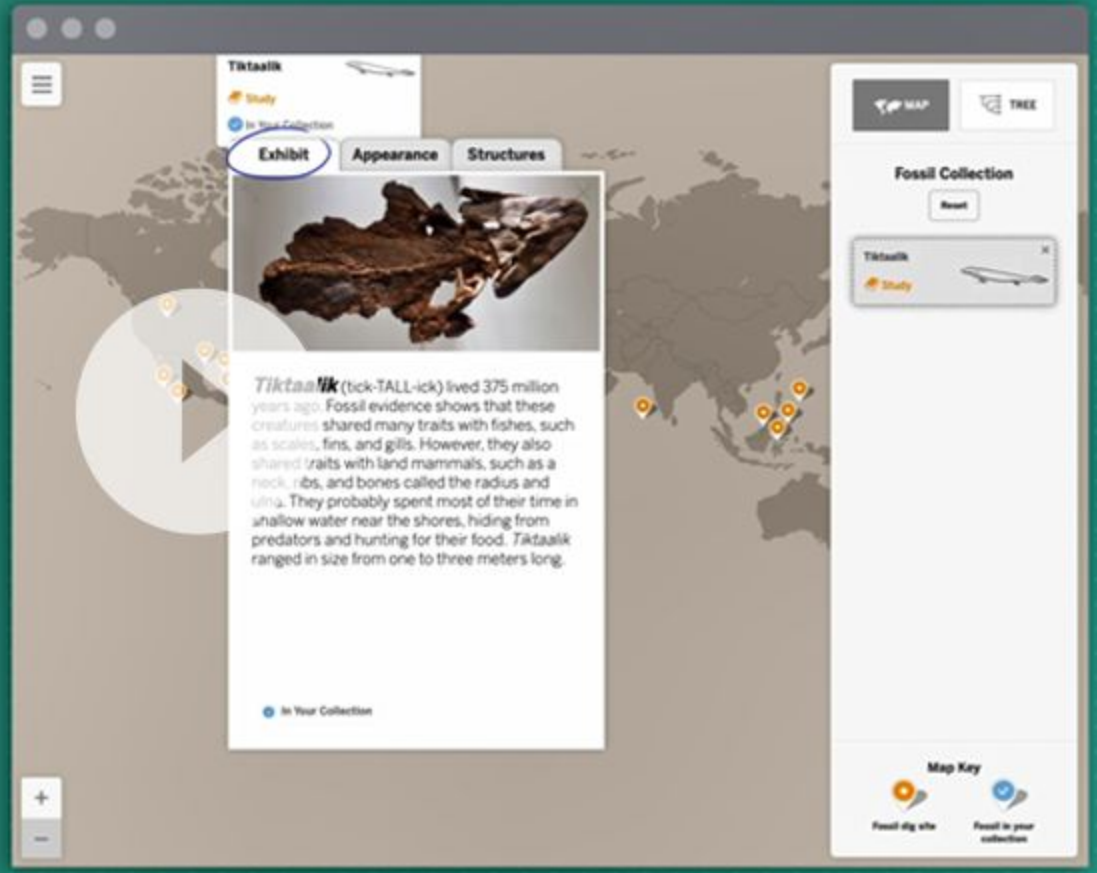


In this unit, you'll use the *Evolutionary History* **Sim** to see how the museum's fossils are related and to think about evolution.

I'll show you a demonstration.


TIP
Tap markers to examine the dig sites.
MAP
TREE
Fossil Collection
Reset
Add Fossils
from the map
Map Key
Fossil dig site
Fossil in your collection

Let's press **Study** to learn more about this fossil. There are three tabs in the Study window: Exhibit, Appearance, and Structures.



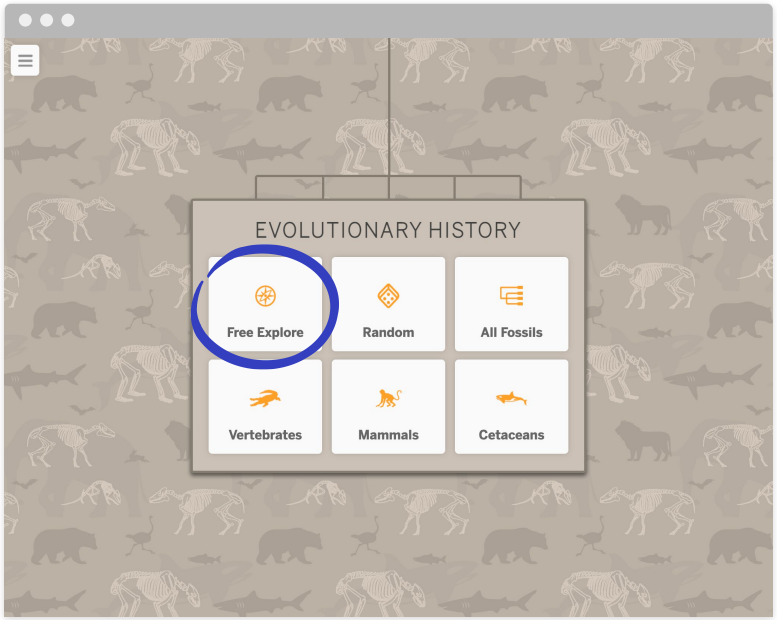
Introducing the Evolutionary History Simulation

Exploring the *Evolutionary History* Simulation

Open the *Evolutionary History* Simulation in Free Explore mode and explore the Sim.

Activity 5

Homework



For this activity, you will open the Sim in **Free Explore** mode.

As you explore, you'll answer a series of questions about different things the Sim can do.

Homework

Exploring the *Evolutionary History* Sim

Open the *Evolutionary History* Sim in Free Explore mode and complete the scavenger hunt questions below.

1. In Map View, what happens when you press one of the orange markers?

- You see a particular fossil discovery at that location.
- You see what city is located in that part of the world.

End of Lesson

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

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Reflect & discuss

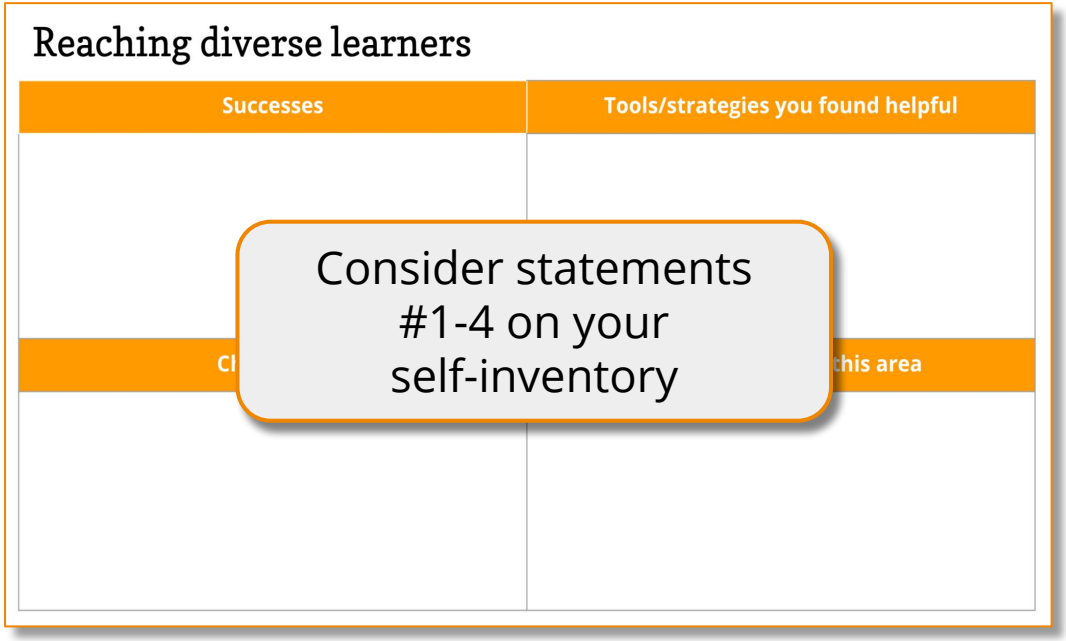
How does this model activity demonstrate & offer opportunities to

- Utilize digital resources to enhance instruction?
- Administer assessments embedded within instruction?
- Utilize data gathered from formative assessments to guide instruction?
- Adjust instruction to respond to the unique cultural & linguistic needs, strengths, and backgrounds of students?

Collaborative reflection: reaching diverse learners

On the slides, enter:

- Successes
- Tools & strategies you found helpful
- Challenges
- Your next steps in this area



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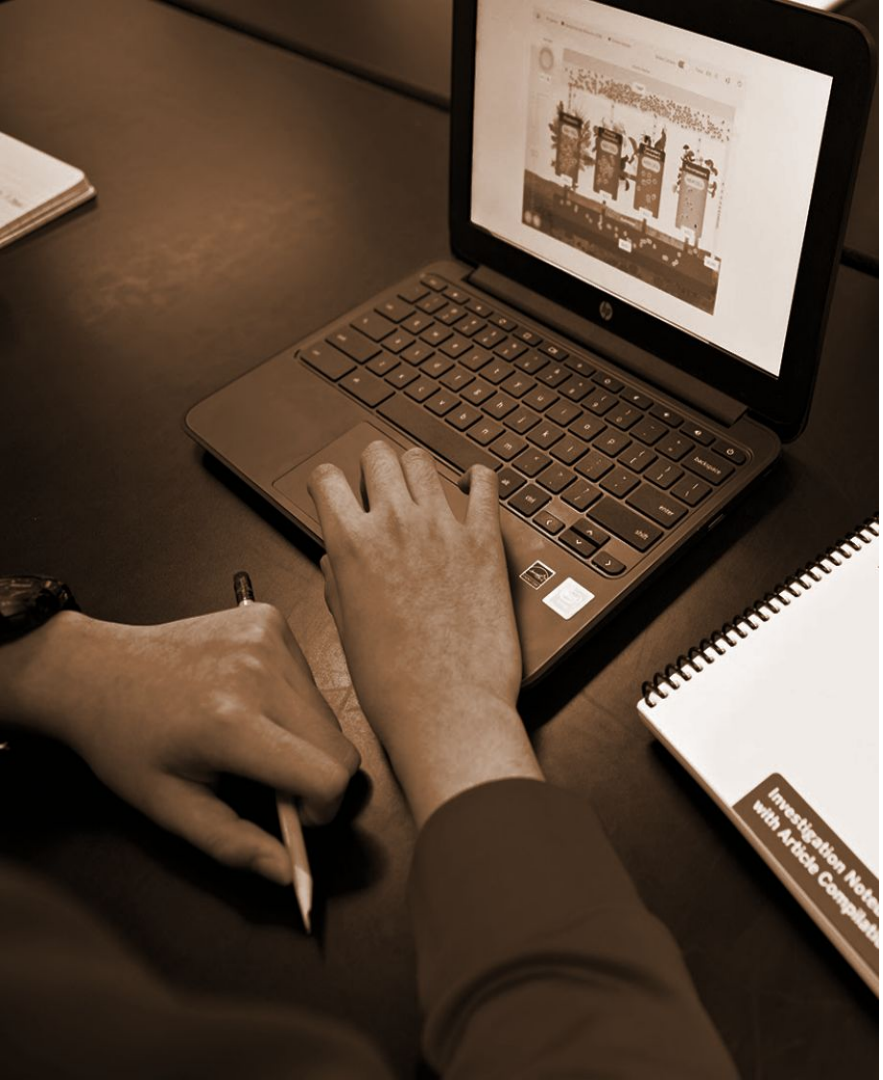

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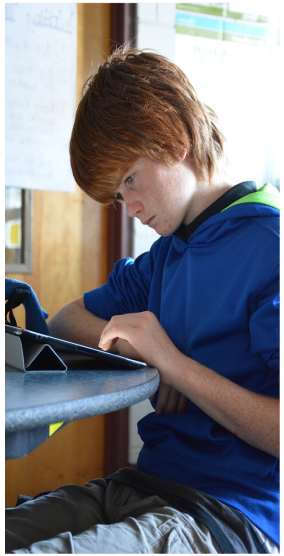
Science & Literacy

Guiding Principles for Disciplinary Literacy in Amplify Science

1. Students can acquire literacy expertise through the pursuit of science knowledge and by engaging in scientific and engineering practices.
2. Attention to disciplinary literacy instruction should begin as soon as students enter school and should continue throughout the grades.
3. Participation in a community is key to acquiring disciplinary expertise and literacy.
4. Argumentation and explanation are the central enterprises of science and, thus, these practices are the focus of reading, writing, and speaking in science.



Accessing complex texts

A typical Active Reading sequence

First Read	Second Read	Third Read
Independent, followed by paired and whole class discussion	Reading for a teacher-directed purpose, followed by a paired, complementary activity	Diving into the text for other, content-related purposes

Active Reading

Students read each article twice
The first read is always to annotate
(questions, connections, comments, etc.

Science and Engineering Practices

8. Obtaining, Evaluating, and Communicating Information

Subsequent reads are for a particular purpose

- **To examine a specific visual representation**
- **To answer a question**
- **To find evidence to support a claim, or**
- **To draw conclusions across texts, etc.**

Support for reading complex text

During various reading experiences

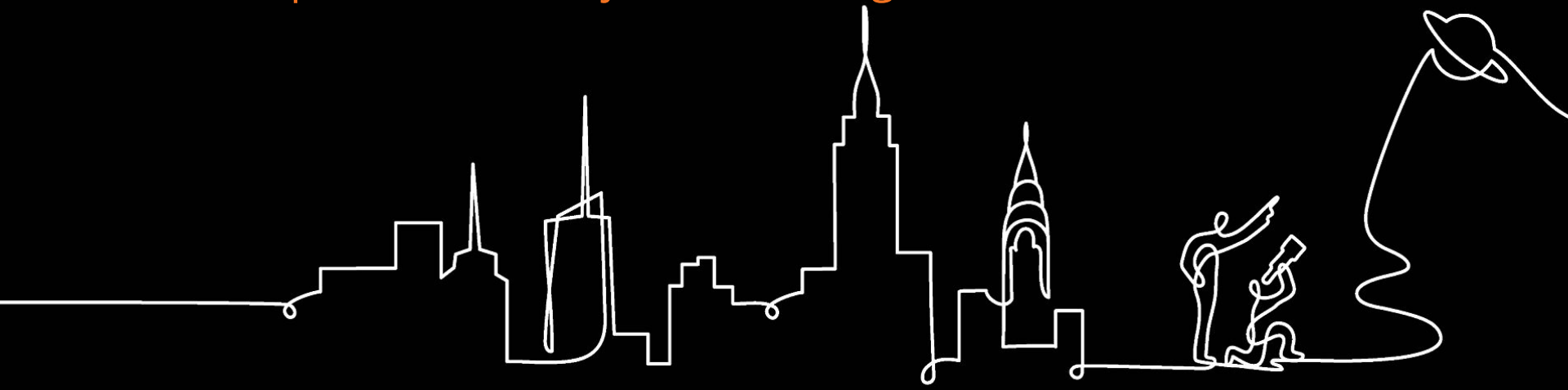
- Variety of reading experiences:
  - Short articles, homework, evidence cards, student notebook / digital platform
- Students are expected to continue using the basic components of Active Reading during these alternate reading experiences;
  - encouraged to annotate and are
  - often provided with guiding questions

Questions?

Supporting academic discourse

Speaking and Listening in Amplify Science

Amplify provides many authentic opportunities, both informal & formal/structured, for speaking and listening as students refine their thinking and communicate their ideas to various audiences. Throughout the Amplify curriculum, students use discussion to construct explanations and join in oral argumentation.



Speaking and Listening in Amplify

- There are many informal opportunities for students to engage with one another as almost every activity in Amplify is meant to be conducted with a partner or small group.
- The primary formal opportunity for student discourse is the Science Seminar for student discourse. Two others are:

Goals for the Science Seminar Sequence

- Apply content knowledge (DCI's and CCC's) gained throughout the unit to address a new scientific problem
- Highlight practices: making arguments from evidence, constructing explanations, analyzing data, communicating information
- Three-dimensional assessment opportunity
- Engagement: student-centered, open-ended, novel context
- Nature of science: questions with no clear answer

Science Seminar: Remote/Hybrid

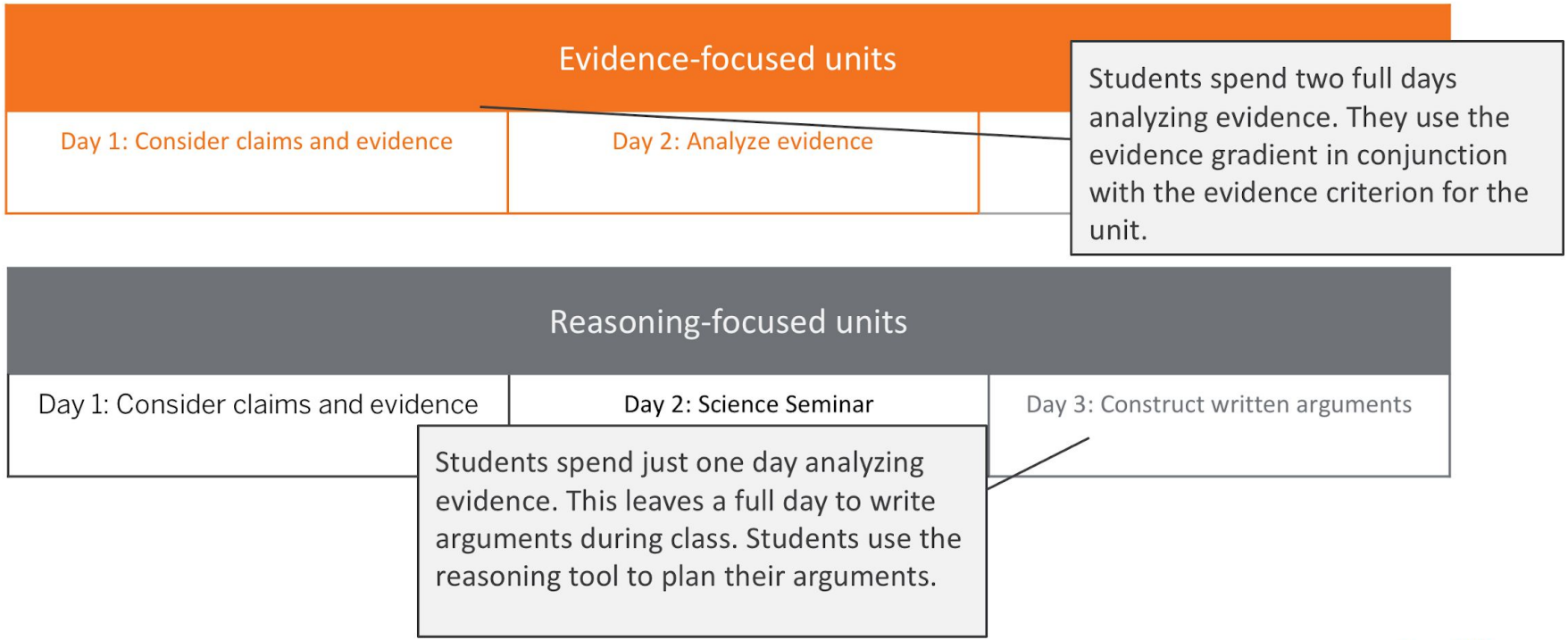
Considering claims and evidence

Participating in the Science Seminar

Writing an argument

Science Seminar sequence:

Evaluating evidence focus vs. reasoning focus



What is academic discourse?

Academic language

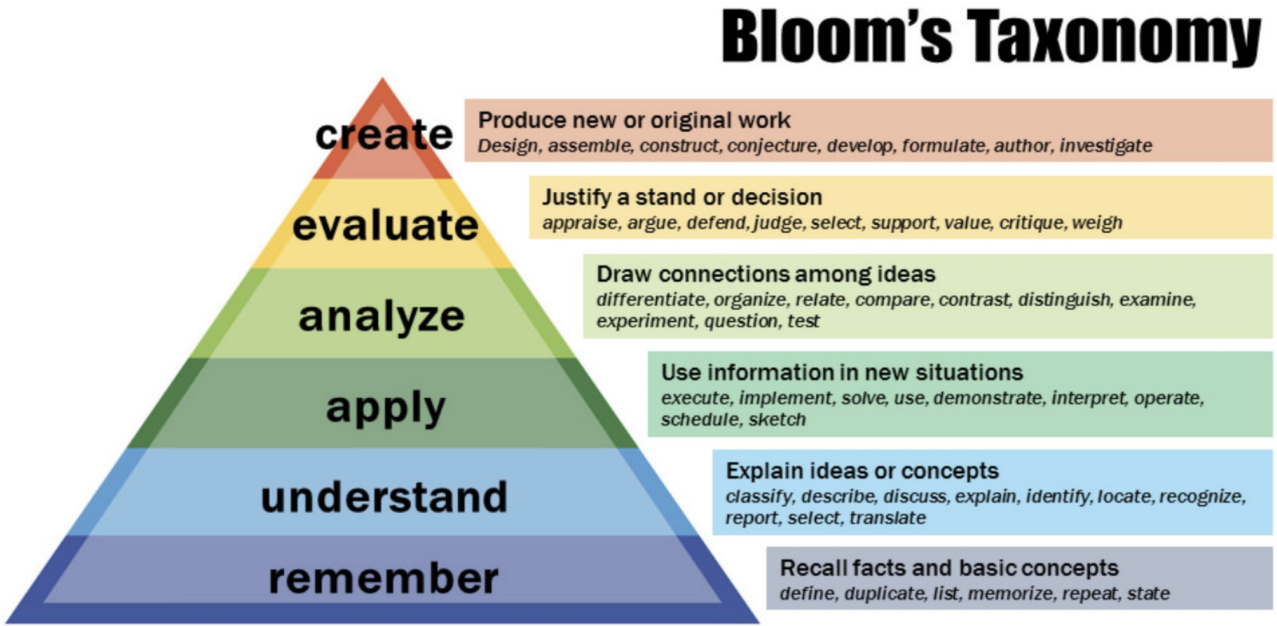
Academic discourse

- Identify…
- What is…?
- List…
- Students use tier 1 and 2 vocabulary

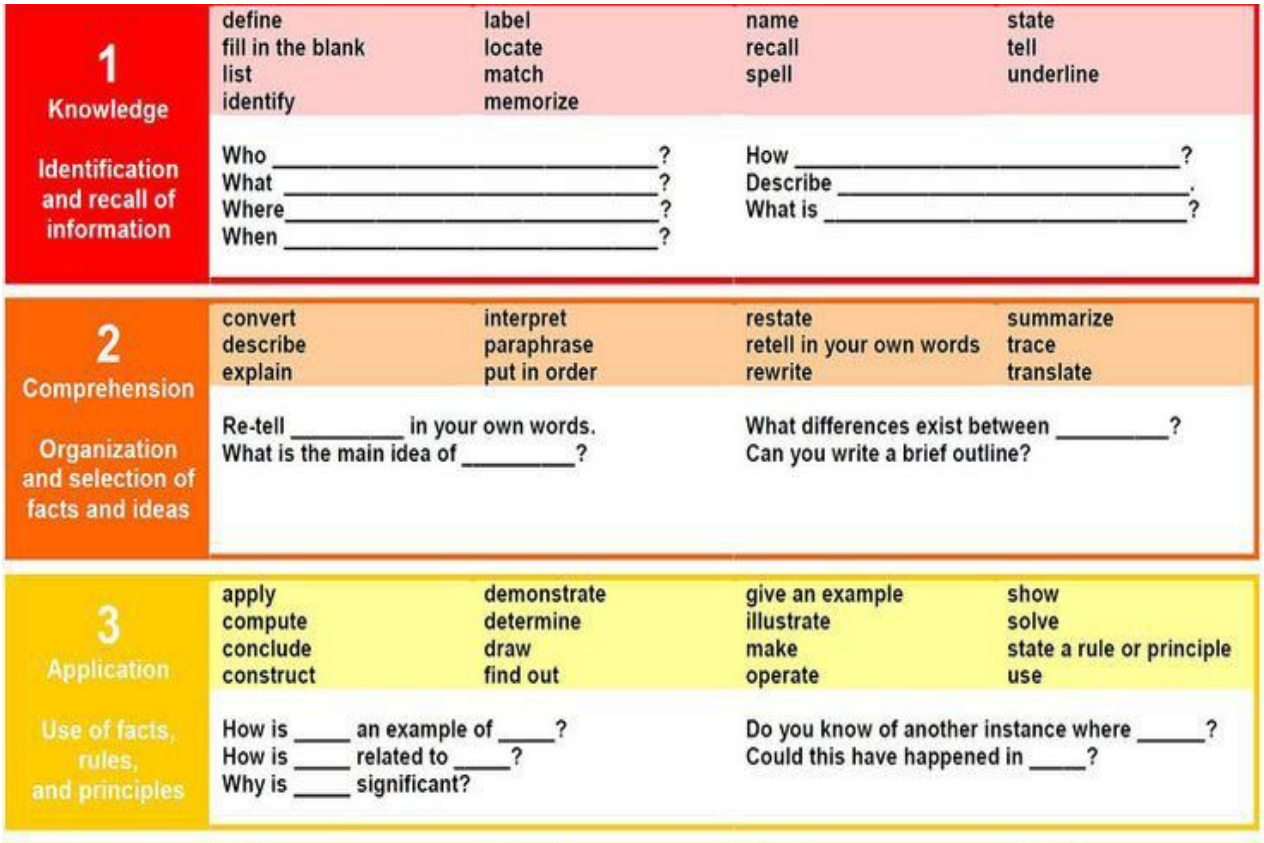
- Prove/disprove with evidence…
- What would happen if….how do you know?
- Explain how this connects to…
- Students use tier 2 & 3 vocabulary

How can strategic teacher questions throughout the lesson promote a higher level of student academic discourse?

Questioning Strategies - In order to engage all learners in the classroom, ensuring everyone has the opportunity to participate in discussions and do the important thinking when a question is posed, teachers use a variety of questioning strategies along Bloom's Taxonomy. Questions are pre-planned prior to the lesson and specifically aligned to the learning objectives and differentiated student needs.



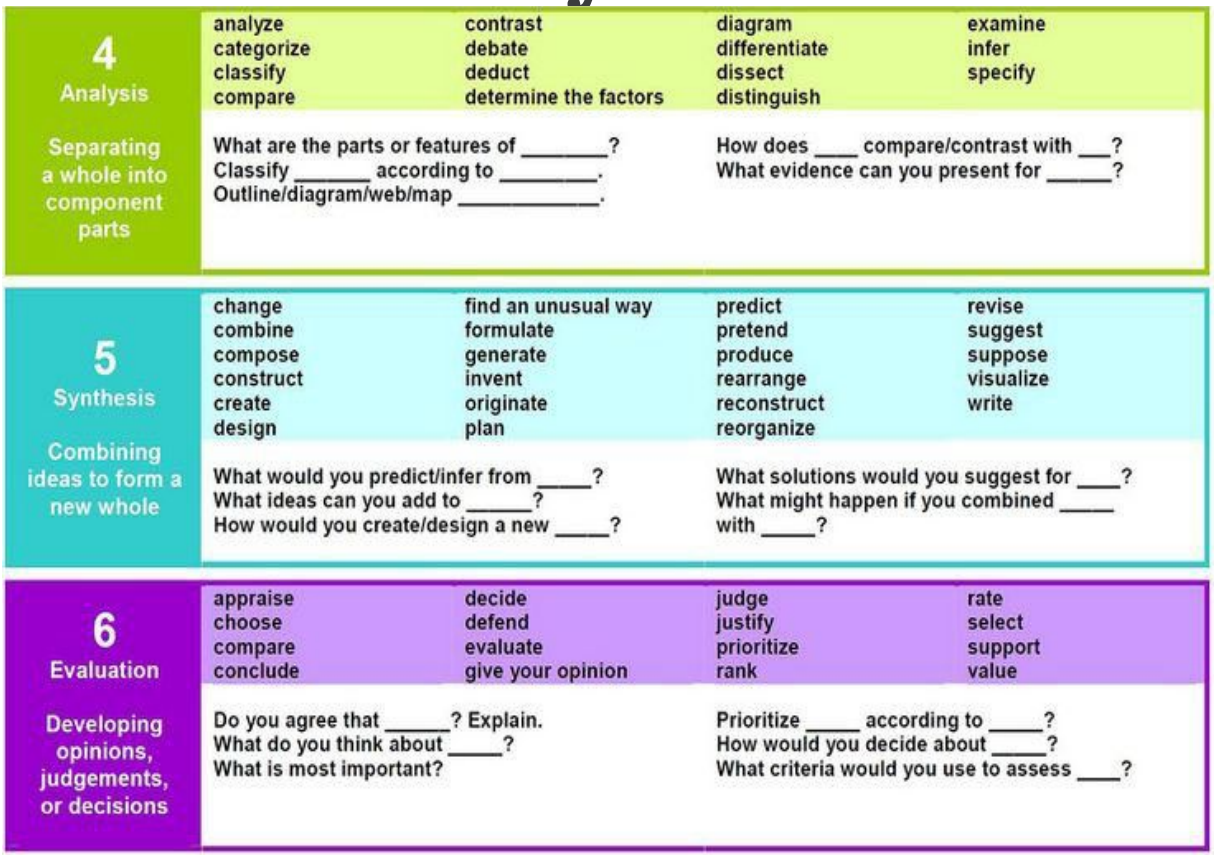
Bloom's Taxonomy



1 Knowledge Identification and recall of information	define fill in the blank list identify	label locate match memorize	name recall spell	state tell underline
	Who _____? What _____? Where _____? When _____?		How _____? Describe _____. What is _____?	
2 Comprehension Organization and selection of facts and ideas	convert describe explain	interpret paraphrase put in order	restate retell in your own words rewrite	summarize trace translate
	Re-tell _____ in your own words. What is the main idea of _____?		What differences exist between _____? Can you write a brief outline?	
3 Application Use of facts, rules, and principles	apply compute conclude construct	demonstrate determine draw find out	give an example illustrate make operate	show solve state a rule or principle use
	How is _____ an example of _____? How is _____ related to _____? Why is _____ significant?		Do you know of another instance where _____? Could this have happened in _____?	

From https://www.teachthought.com/learning-models/25-question-stems-framed-around-blooms-taxonomy

Bloom's Taxonomy



4 Analysis Separating a whole into component parts	analyze categorize classify compare	contrast debate deduct determine the factors	diagram differentiate dissect distinguish	examine infer specify
	What are the parts or features of _____? Classify _____ according to _____. Outline/diagram/web/map _____.		How does ____ compare/contrast with ___? What evidence can you present for _____?	
5 Synthesis Combining ideas to form a new whole	change combine compose construct create design	find an unusual way formulate generate invent originate plan	predict pretend produce rearrange reconstruct reorganize	revise suggest suppose visualize write
	What would you predict/infer from _____? What ideas can you add to _____? How would you create/design a new _____?		What solutions would you suggest for ____? What might happen if you combined _____ with _____?	
6 Evaluation Developing opinions, judgements, or decisions	appraise choose compare conclude	decide defend evaluate give your opinion	judge justify prioritize rank	rate select support value
	Do you agree that _____? Explain. What do you think about _____? What is most important?		Prioritize _____ according to _____? How would you decide about _____? What criteria would you use to assess ____?	

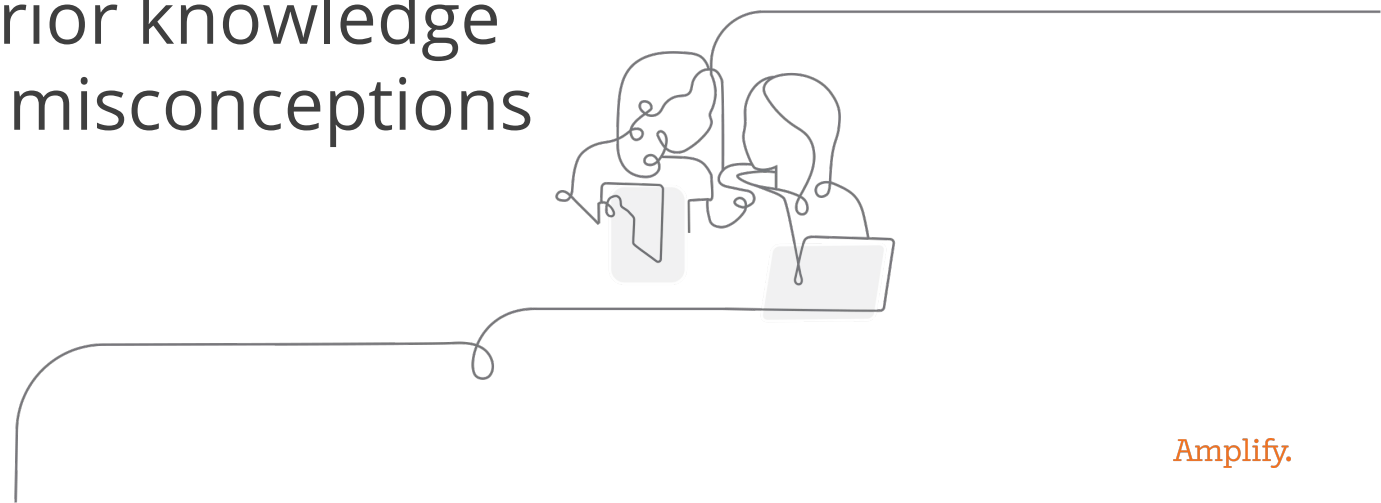
From https://www.teachthought.com/learning-models/25-question-stems-framed-around-blooms-taxonomy/

To make connections within a unit of study, ask students to:

- **Remember:** What are we figuring out in this unit? What do you already know?
- **Understand:** Describe how this lesson activity is connected to the unit/chapter/investigation question?
- **Apply:** Use the unit vocabulary to enhance your scientific explanation.
- **Analyze:** What information can you use from the Simulation to support your explanation or argument? Describe how the ideas / concepts fit together?
- **Evaluate:** Defend your claim with at least two sources of evidence. Critique the argument of a peer and provide feedback on their supporting evidence.
- **Create:** Design a model to support the solution.

Questioning in Amplify Science

- clarify understanding
- justify claims
- verify evidence
- accessing prior knowledge
- uncovering misconceptions

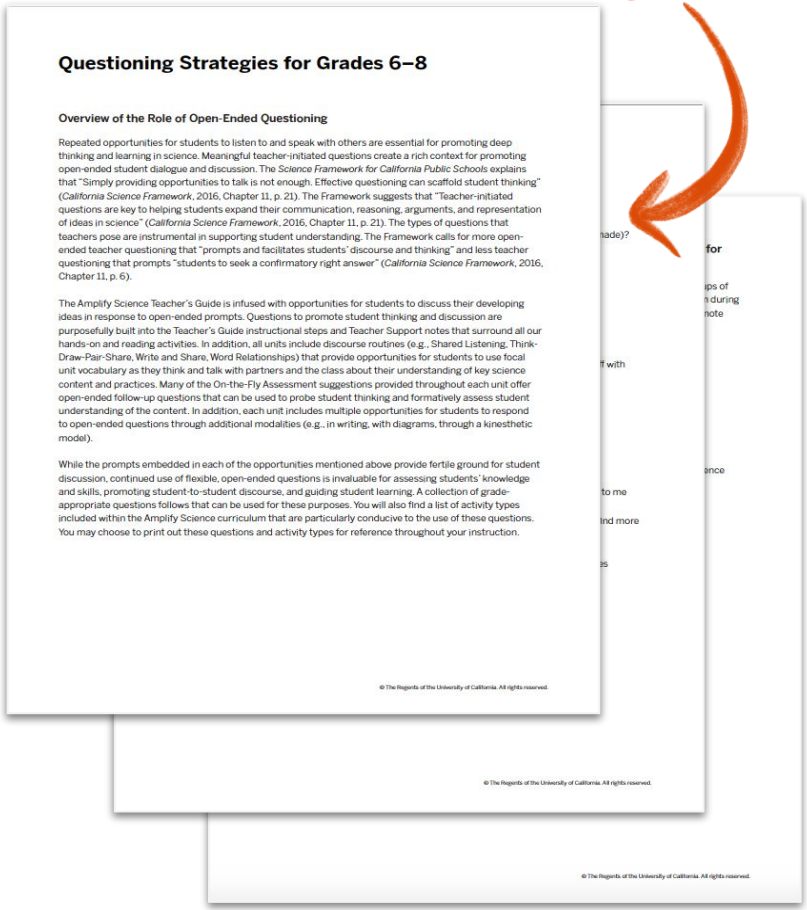


Questioning Strategies

Open-Ended Questions to Facilitate Student Thinking & Discourse

- Questions to assess students' knowledge and skills
- Questions to promote student-to-student discourse
- Questions to guide student learning

Pages 2-4



Questioning Strategies for Grades 6–8

Overview of the Role of Open-Ended Questioning

Repeated opportunities for students to listen to and speak with others are essential for promoting deep thinking and learning in science. Meaningful teacher-initiated questions create a rich context for promoting open-ended student dialogue and discussion. The *Science Framework for California Public Schools* explains that "Simply providing opportunities to talk is not enough. Effective questioning can scaffold student thinking" (*California Science Framework*, 2016, Chapter 11, p. 21). The Framework suggests that "Teacher-initiated questions are key to helping students expand their communication, reasoning, arguments, and representation of ideas in science" (*California Science Framework*, 2016, Chapter 11, p. 21). The types of questions that teachers pose are instrumental in supporting student understanding. The Framework calls for more open-ended teacher questioning that "prompts and facilitates students' discourse and thinking" and less teacher questioning that prompts "students to seek a confirmatory right answer" (*California Science Framework*, 2016, Chapter 11, p. 6).

The Amplify Science Teacher's Guide is infused with opportunities for students to discuss their developing ideas in response to open-ended prompts. Questions to promote student thinking and discussion are purposefully built into the Teacher's Guide instructional steps and Teacher Support notes that surround all our hands-on and reading activities. In addition, all units include discourse routines (e.g., Shared Listening, Think-Draw-Pair-Share, Write and Share, Word Relationships) that provide opportunities for students to use focal unit vocabulary as they think and talk with partners and the class about their understanding of key science content and practices. Many of the On-the-Fly Assessment suggestions provided throughout each unit offer open-ended follow-up questions that can be used to probe student thinking and formatively assess student understanding of the content. In addition, each unit includes multiple opportunities for students to respond to open-ended questions through additional modalities (e.g., in writing, with diagrams, through a kinesthetic model).

While the prompts embedded in each of the opportunities mentioned above provide fertile ground for student discussion, continued use of flexible, open-ended questions is invaluable for assessing students' knowledge and skills, promoting student-to-student discourse, and guiding student learning. A collection of grade-appropriate questions follows that can be used for these purposes. You will also find a list of activity types included within the Amplify Science curriculum that are particularly conducive to the use of these questions. You may choose to print out these questions and activity types for reference throughout your instruction.

Department of Education
Chancellor Richard A. Carranza

The Hallmarks of Advanced Literacy: A Common Set of Instructional Practices

Hallmark 2 of Advanced Literacies Instruction: Classroom Discussion

...fostering engagement by focusing on building student autonomy and collaboration produces greater gains in achievement and we know that talk-based learning tasks and projects can do exactly this—when there is choice, roles, and collaboration involved, they are a great way to promote students' sense of autonomy as learners.

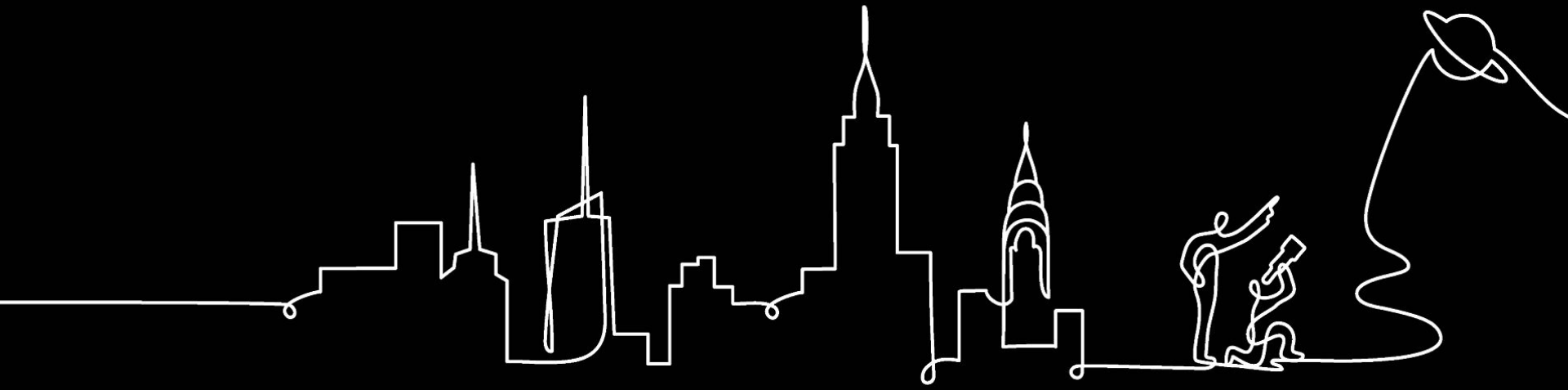
Nonie K. Lesaux, PhD & Emily Phillips Galloway, EdD

Questions?

Writing in Science

Writing in Amplify Science

Purposeful, communicative writing is an integral part of the Amplify Science curriculum. Students write daily for many different purposes.

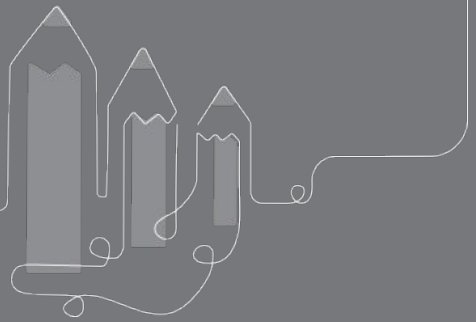


Why do students write in Amplify Science?

- To activate background knowledge
- To reflect on understanding
- To communicate
  - To explain
  - To persuade
- To record data / observations
- To have a record of your own thinking

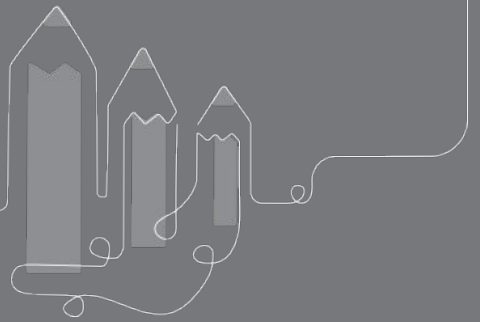
“Small writes” prompt students to **synthesize** new understandings with existing conceptual knowledge.

Examples: daily warm-ups & evidence card annotations



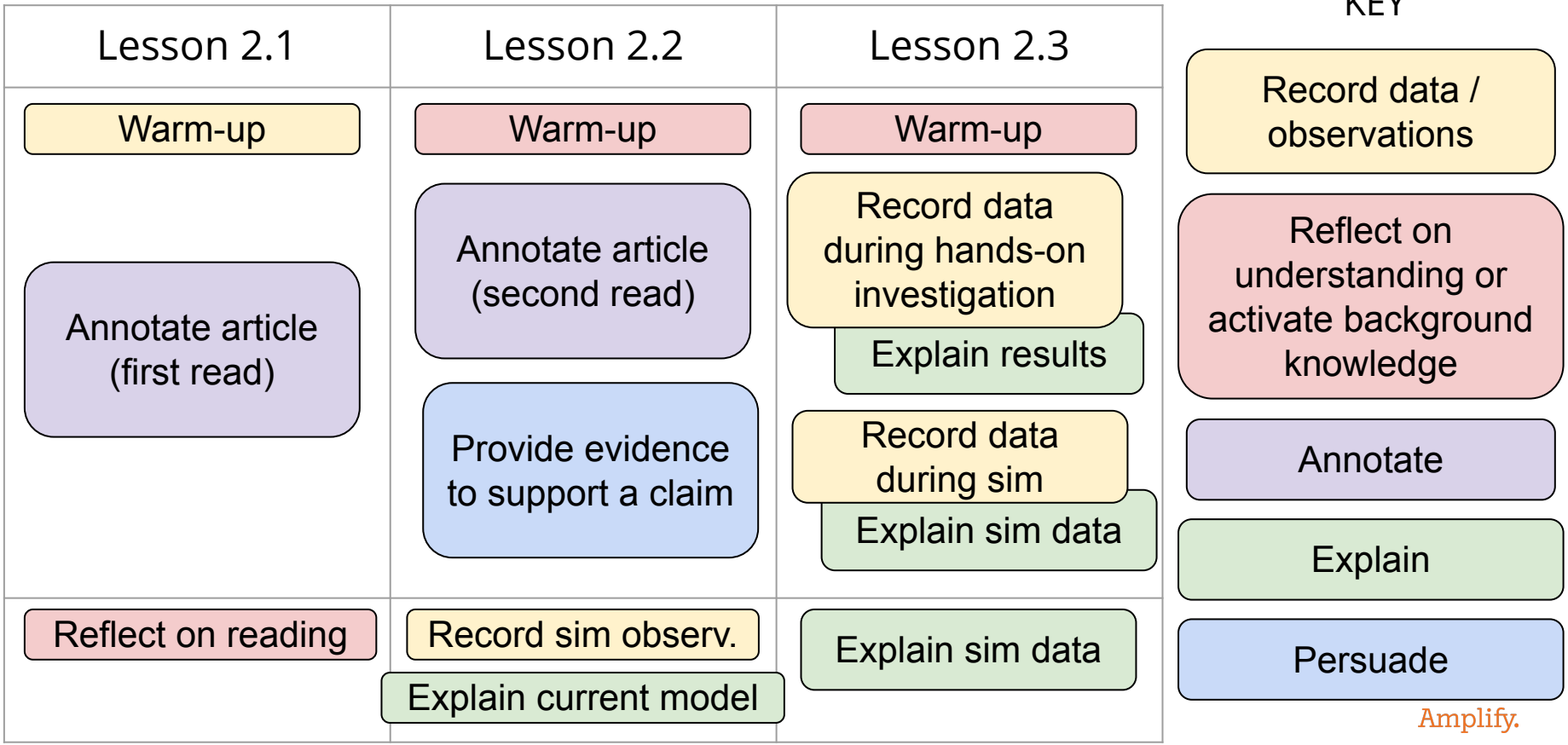
As they gather evidence, students engage in writing and discussion. They make sense of evidence they gather through these through small writes.

Writing is a **key part of the multimodal approach** as students figure out a phenomenon.



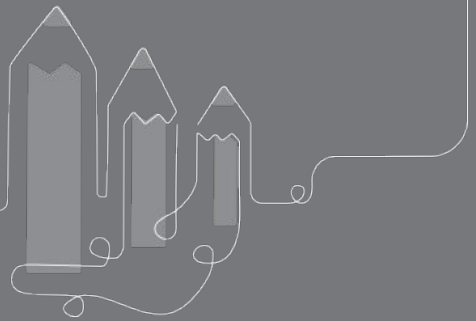
Example

Writing across a chapter: different purposes for writing in *Oceans, Atmosphere and Climate* Chapter 2

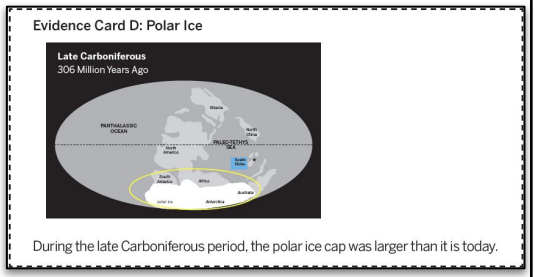


The “big write” : Science Seminar final written argument

Students’ argumentation writing is scaffolded in many significant ways. For example, for units where Reasoning is a focus, the Reasoning Tool was conceived of as a scaffold for supporting students in thinking about and identifying the reasoning that would be needed to make a convincing argument.

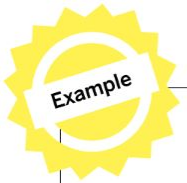


Reasoning Tool

Evidence	This matters because . . . (How does this evidence support the claim?)	Therefore, . . . (claim)
Evidence card D  	The current that flowed from the South pole past South China would have gotten really cold. It would have been colder than the air and the air would have transferred a lot of energy and cooled down.	South China was cooler than it is today.

Using the Reasoning Tool to Support Your Claim

- Circle your strongest piece of evidence.
- Draw an *X* over those pieces of evidence that you do not plan to use in your argument.
- Draw an arrow to connect pieces of evidence that go together.



Evidence	This matters because . . . (How does this evidence support the claim?)	Therefore, . . . (claim)
Sample Evidence Card A	Your ideas about how the evidence supports the claim	Your claim
Sample Evidence Card B	Your ideas about how the evidence supports the claim	
Sample Evidence Card C	Your ideas about how the evidence supports the claim	

Scientific Argument Sentence Starters

An additional scaffold

Describing evidence:	**Describing how evidence supports a claim:**
The evidence that supports my claim is… My first piece of evidence is… Another piece of evidence shows that…	If _____, then… This change caused… The effect of this change was… This is important because… Since… Based on the evidence, I conclude that… This claim is stronger because…

Using the Reasoning Tool to Write an Argument

State your claim.

I support Claim ___ , which states that South China during the late Carboniferous was . . .

Describe the evidence.

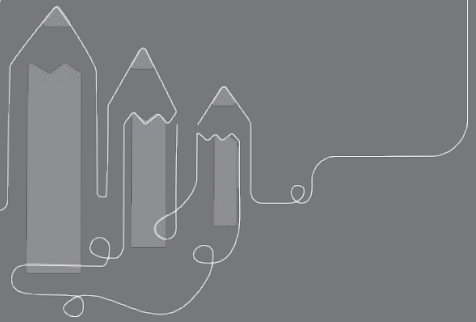
In the late Carboniferous, South China . . . (Evidence Card ___). Another evidence card shows . . .

Explain how the evidence supports the claim.

Together, this evidence shows . . .

Some of the most challenging aspects of scientific argumentation are providing **sufficient high quality evidence** and using **reasoning** to make clear the connections between pieces of evidence and the claim.

The science seminar sequence provides **scaffolds** for these challenges.



Rubrics for Assessing Students' Final Written Arguments

Three-dimensional

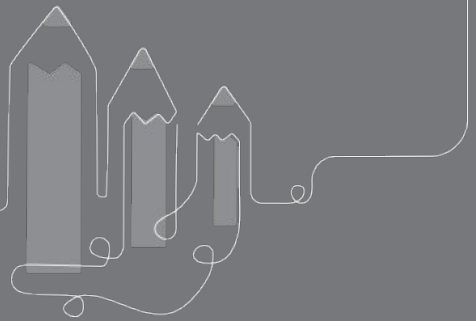
- Rubric 1: Assessing Students' Understanding of Science Concepts (DCIs) — summative
- Rubric 2: Assessing Students' Understanding of the Crosscutting Concept of Cause and Effect — summative
- Rubric 3: Assessing Students' Performance of the Practice of Constructing Scientific Arguments — formative

Rubric 3: Assessing Students' Performance of the Practice of Constructing Scientific Arguments

- Formative rubric
- Provides suggestions for feedback
- Possible responses supporting each claim

Criteria for a strong written argument
Takes a stance
Explanatory
Justified by the reasoned use of evidence
Employs high-quality information
Clear and well-organized

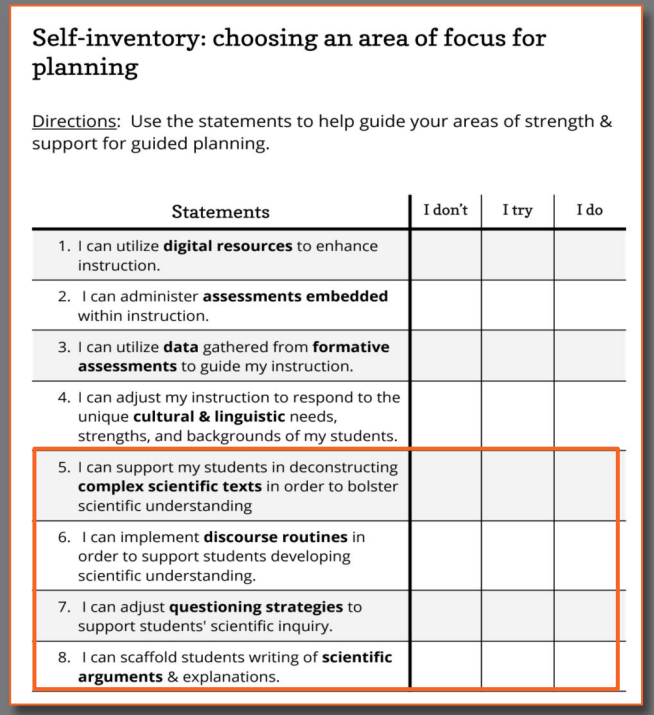
The Rubrics for Assessing Students' Final Written Arguments provide guidance you can use as you review and provide feedback on students' writing **throughout the unit.**



Model activity

As you observe activity, focus on your successes, challenges, & next steps from this area of self-inventory

5,6,7,8

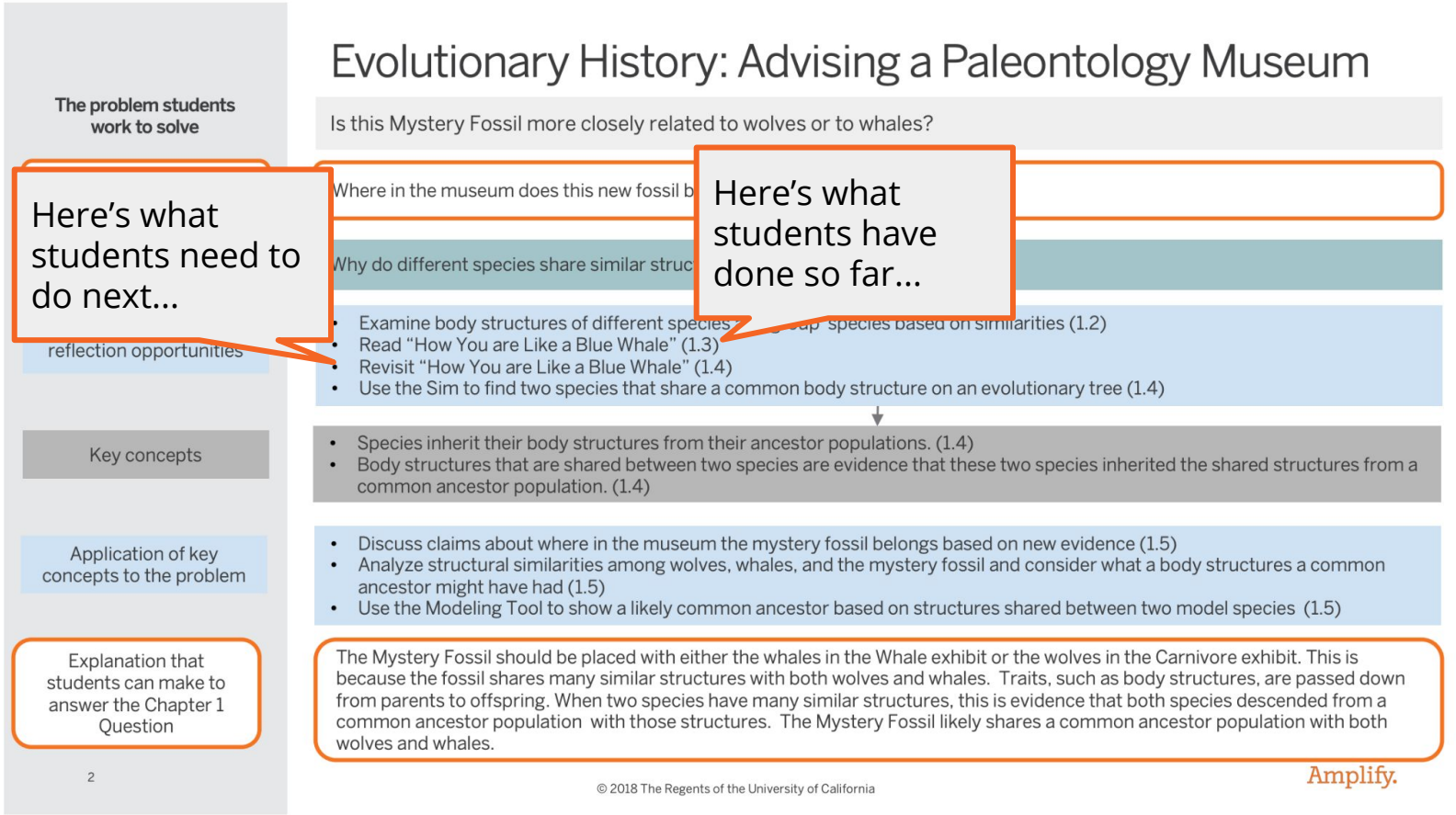


Self-inventory: choosing an area of focus for planning

Directions: Use the statements to help guide your areas of strength & support for guided planning.

Statements	I don't	I try	I do
1. I can utilize **digital resources** to enhance instruction.			
2. I can administer **assessments embedded** within instruction.			
3. I can utilize **data** gathered from **formative assessments** to guide my instruction.			
4. I can adjust my instruction to respond to the unique **cultural & linguistic** needs, strengths, and backgrounds of my students.			
5. I can support my students in deconstructing **complex scientific texts** in order to bolster scientific understanding			
6. I can implement **discourse routines** in order to support students developing scientific understanding.			
7. I can adjust **questioning strategies** to support students' scientific inquiry.			
8. I can scaffold students writing of **scientific arguments** & explanations.			

Evolutionary History: Advising a Paleontology Museum



Amplify.

Evolutionary History

Lesson 1.4: Interpreting Evolutionary Trees

AmplifyScience

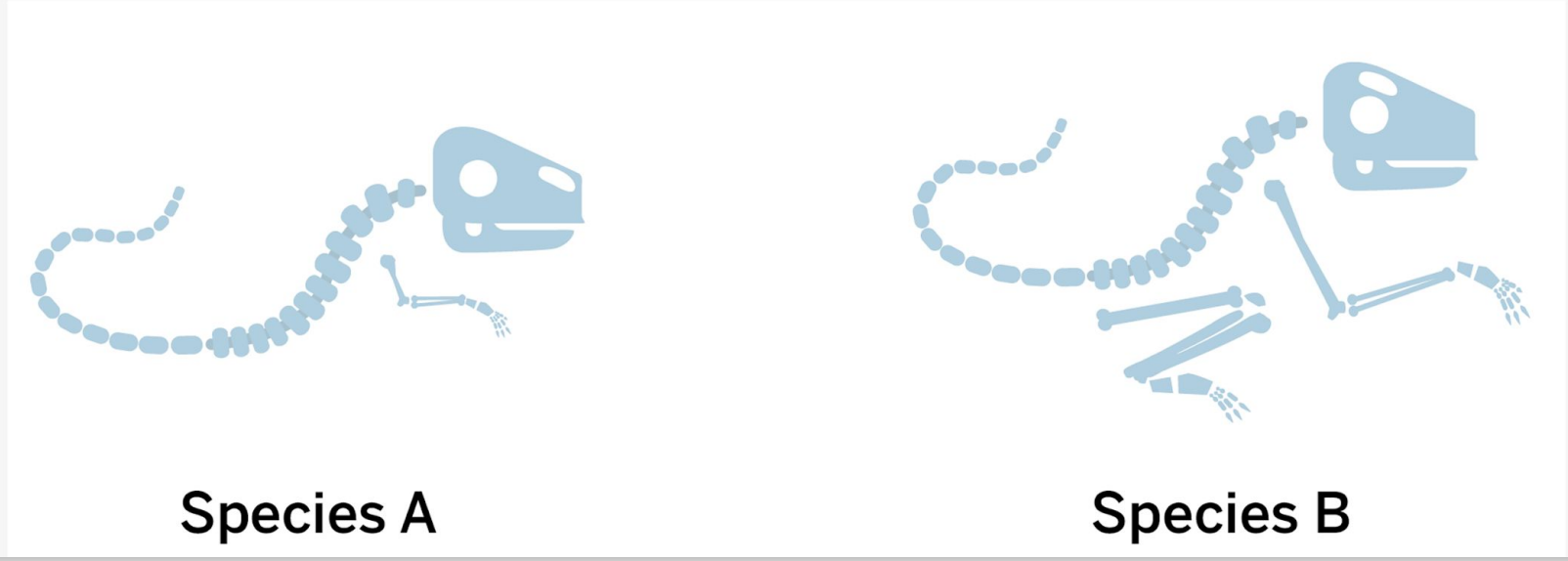
7 MIN

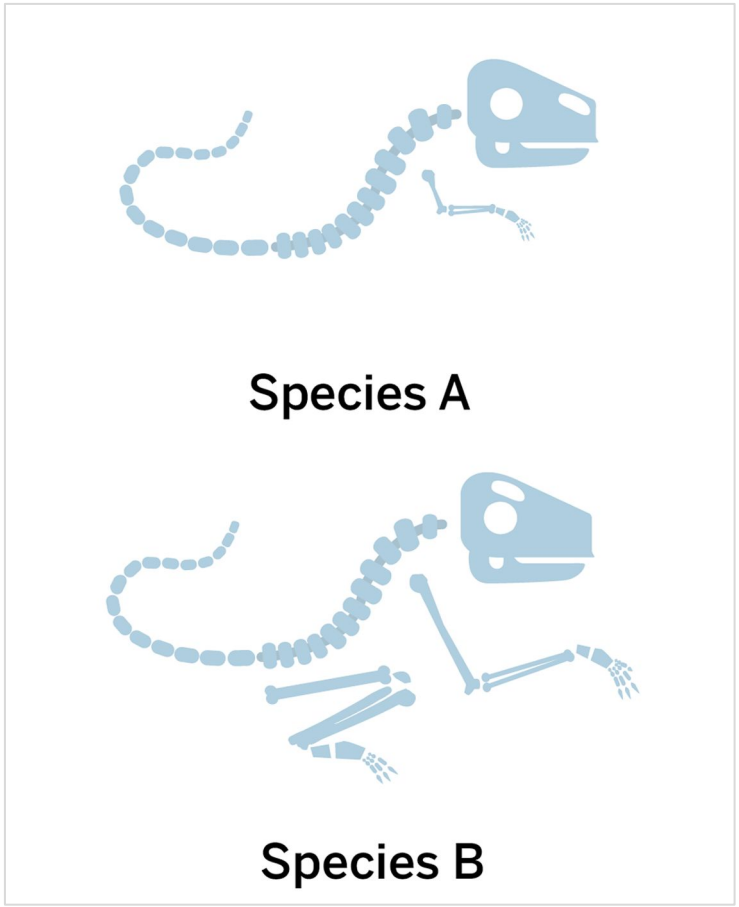
Activity 1

Warm-Up

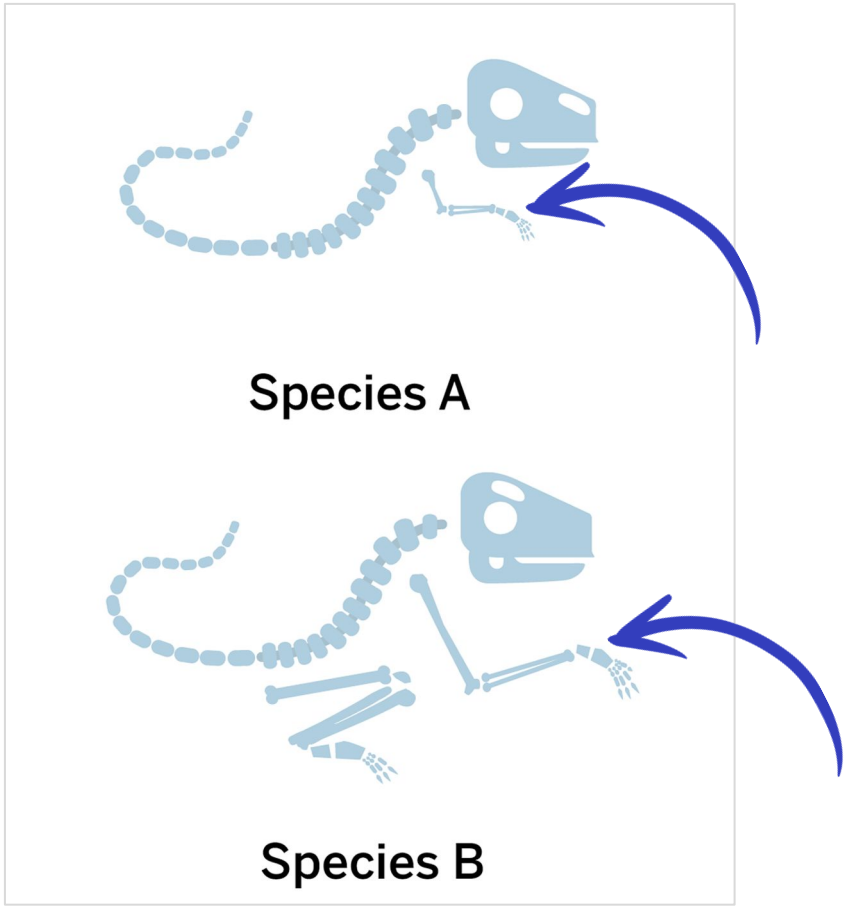
Warm-Up

Comparing Body Structures



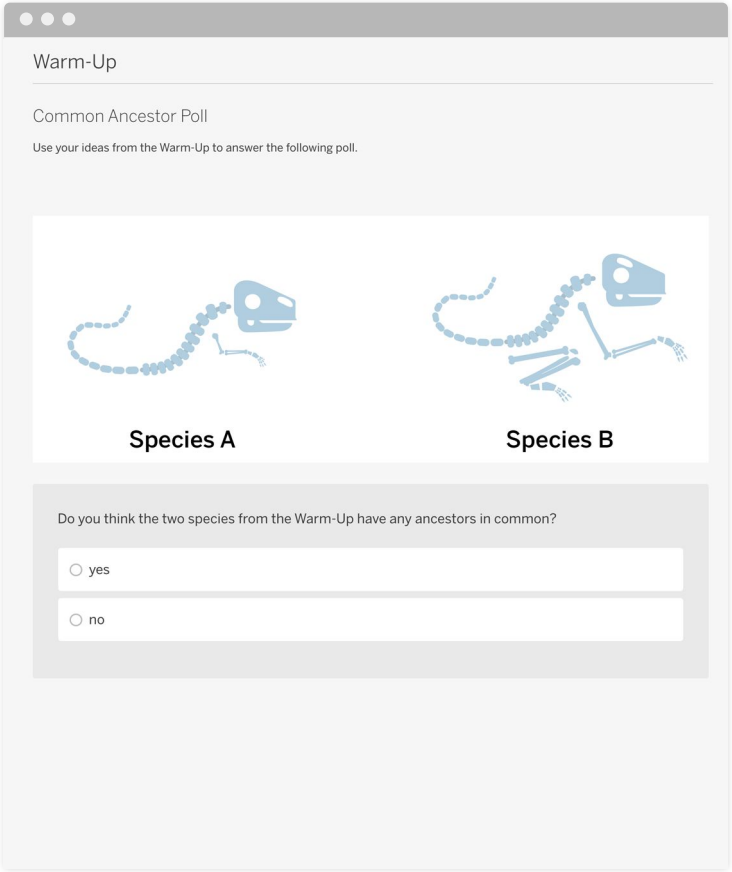


Let's discuss the **shared structures** these two imaginary species both have.



The front limbs have the same basic arrangement of bones, so they are a **shared structure.**

Scientists look for shared structures to decide if species are **related.**



Next, we'll have a class poll.

Decide whether you think Species A and Species B have any **ancestors** in common.

Let’s discuss the results of our poll.

Do you think the two species have any **ancestors** in common?

Explain your thinking.

Activity 2

Second Read: “How You Are Like a Blue Whale”

Vocabulary

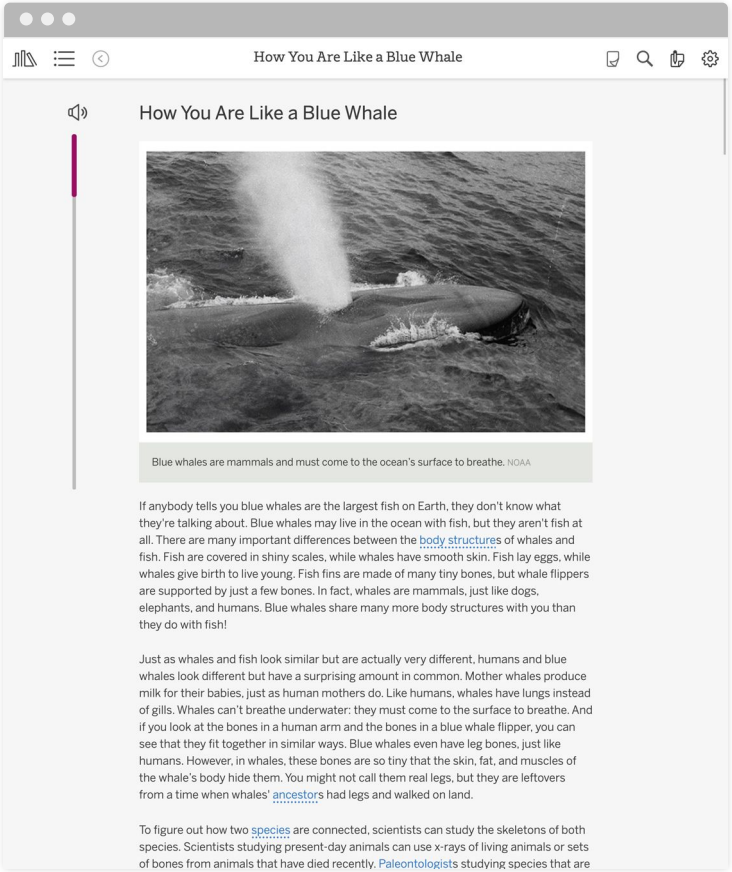
descendant species

a more recent species that evolved from an ancestor population

Vocabulary

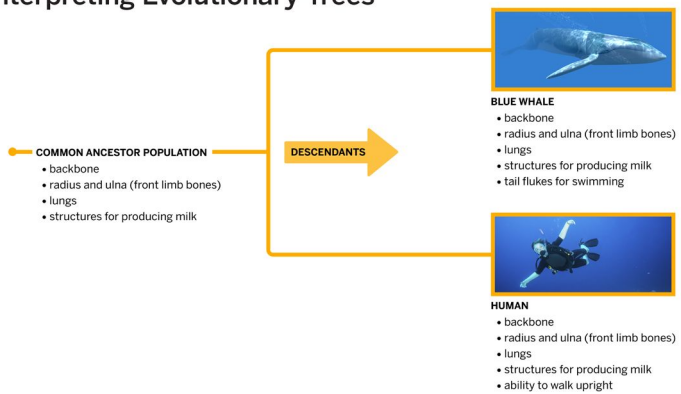
common ancestor population

an older population from which two or more newer species descended



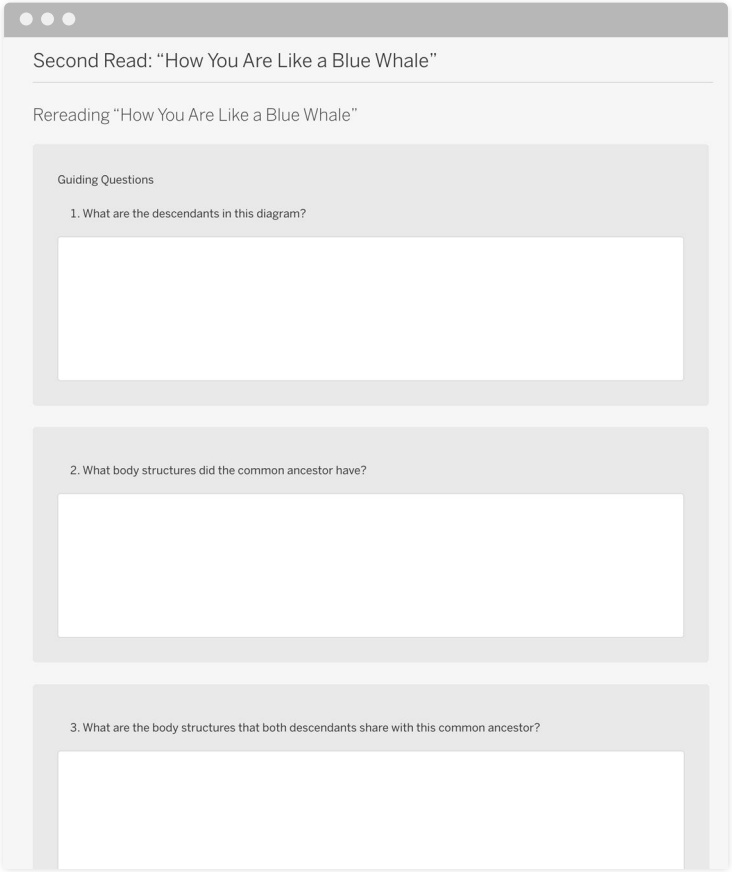
Today, you will **reread** part of the article "How You Are Like a Blue Whale" to learn more about common ancestors.

Interpreting Evolutionary Trees



Humans and blue whales have many shared structures. Based on this information, paleontologists know that these species descended from a common ancestor population that also had those body structures.

You will only reread the information in the **evolutionary tree** diagram, focusing on shared structures and how these can provide evidence about common ancestors.

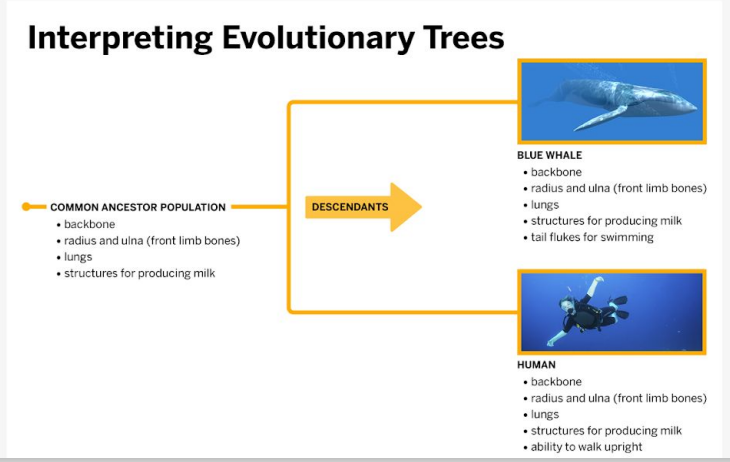


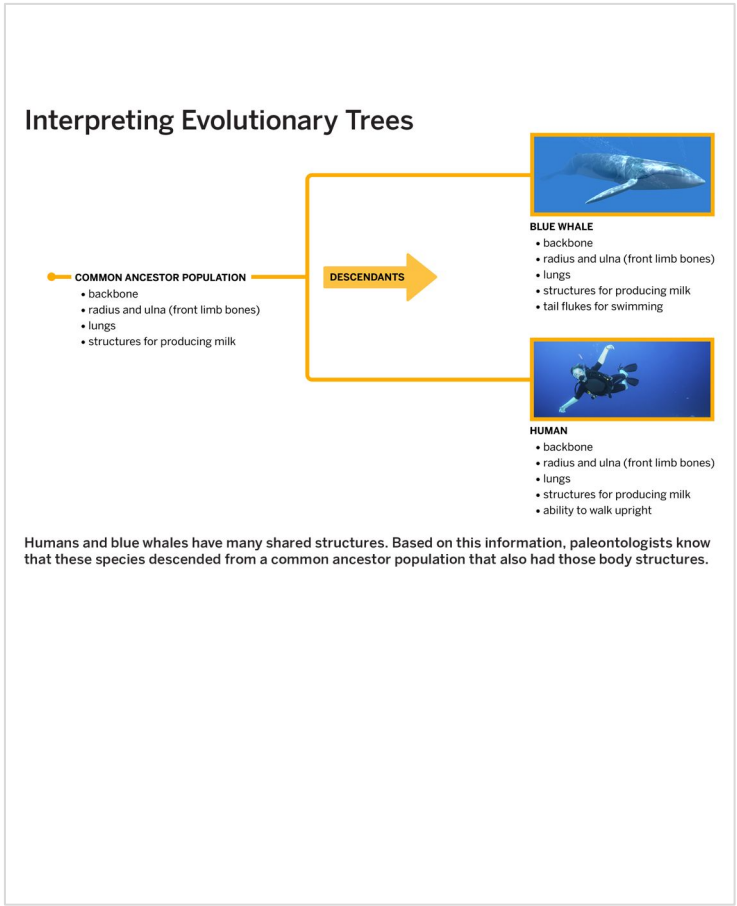
As you reread the diagram, you’ll answer some **guiding questions.**

Second Read: "How You Are Like a Blue Whale"

Rereading "How You Are Like a Blue Whale"

Reread the small excerpt below from the article "How You Are Like a Blue Whale" and answer the guiding questions. As you read, think about this question: *Why do different species share similar structures?*





Next, we'll interpret the evolutionary tree diagram as a class.

I'll project a larger version of the diagram for our discussion.

Interpreting Evolutionary Trees

COMMON ANCESTOR POPULATION

- backbone
- radius and ulna (front limb bones)
- lungs
- structures for producing milk

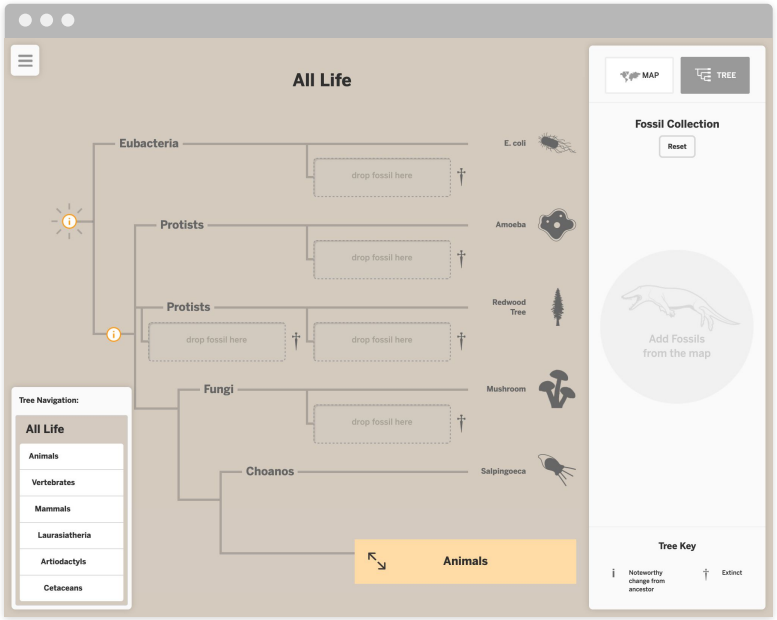
DESCENDANTS

BLUE WHALE

- backbone
- radius and ulna (front limb bones)
- lungs
- structures for producing milk
- tail flukes for swimming

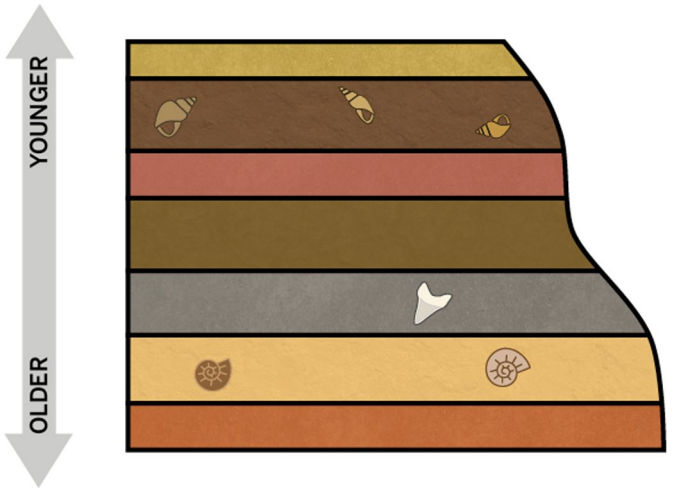
HUMAN

- backbone
- radius and ulna (front limb bones)
- lungs
- structures for producing milk
- ability to walk upright



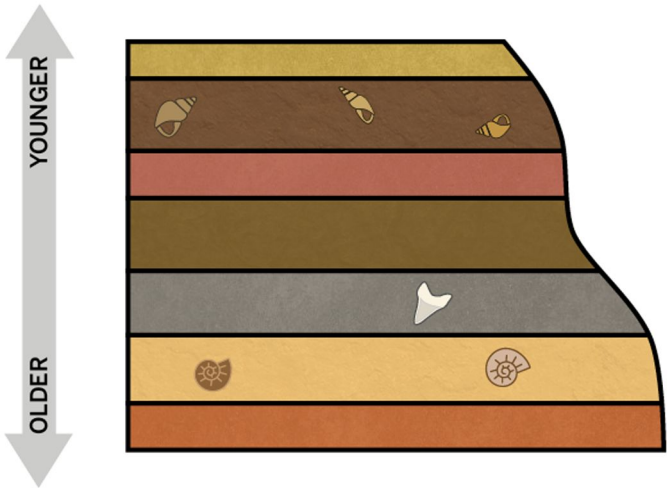
The evolutionary trees in our Sim are more complex.

The Sim includes many species, some that are alive today and others that are extinct.



Scientists know about the extinct species in the Sim from **fossil evidence** found in layers of rock.

Using that evidence, the species were placed in chronological order.



Remember that sedimentary rock layers form with younger layers on top.

Which fossils in this diagram are **oldest**, and which are **youngest?**

Explain **how you know.**

Reflect & discuss

How does this model activity demonstrate & offer opportunities to

- Support students in deconstructing complex scientific texts in order to bolster scientific understanding?
- Implement discourse routines in order to support students developing scientific understanding?
- Adjust questioning strategies to support students' scientific inquiry?
- Scaffold students' writing of scientific arguments & explanations?

Collaborative reflection: science & literacy

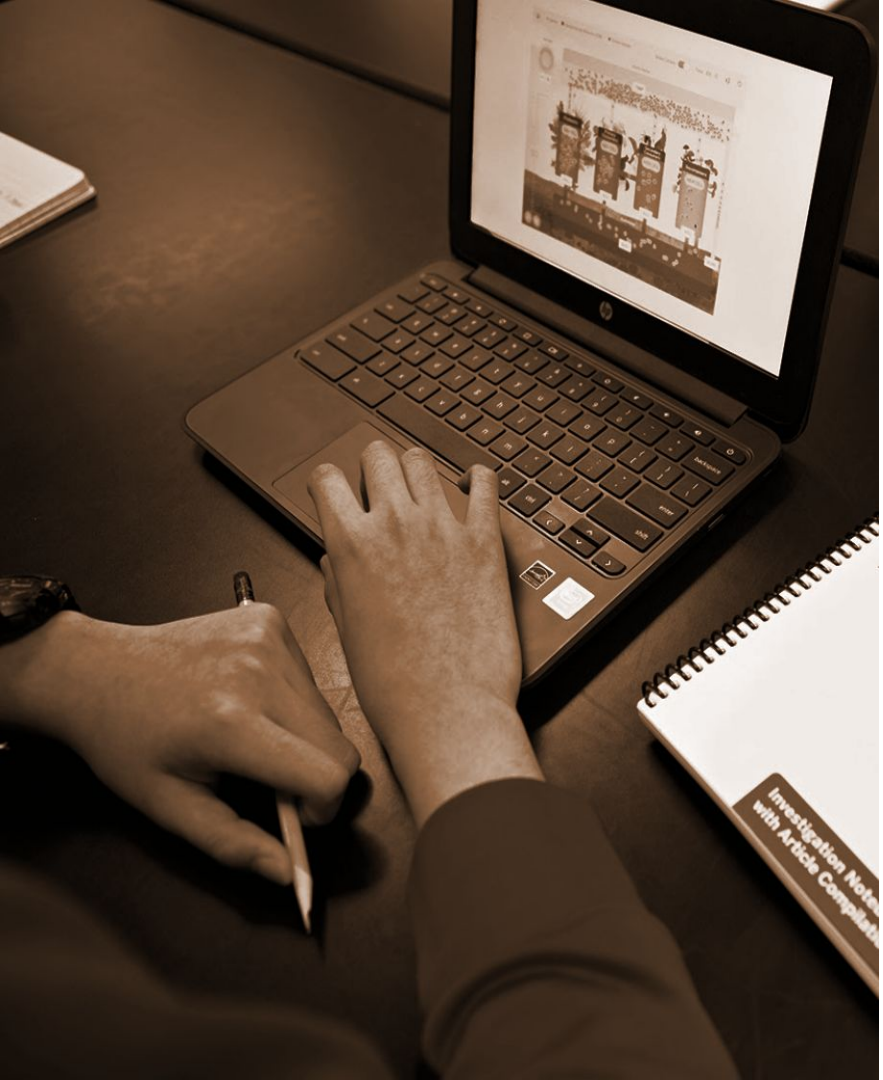
On the slides, enter:

- Successes
- Tools & strategies you found helpful
- Challenges
- Your next steps in this area

Questions?

BREAK (15 minutes)

Questions?

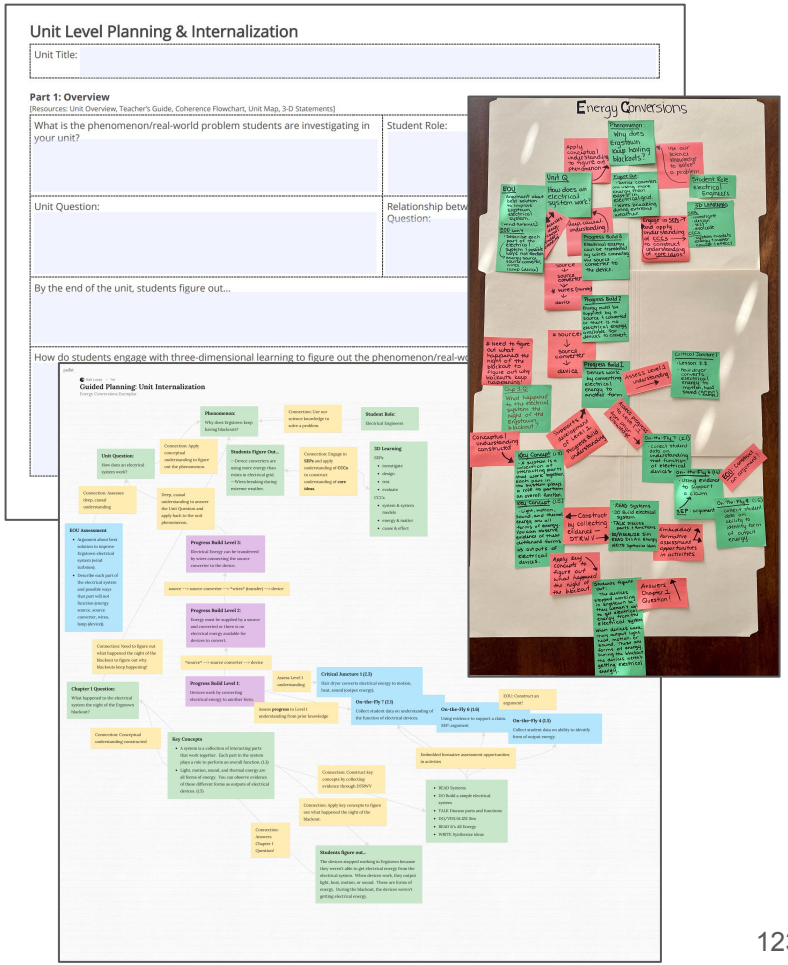


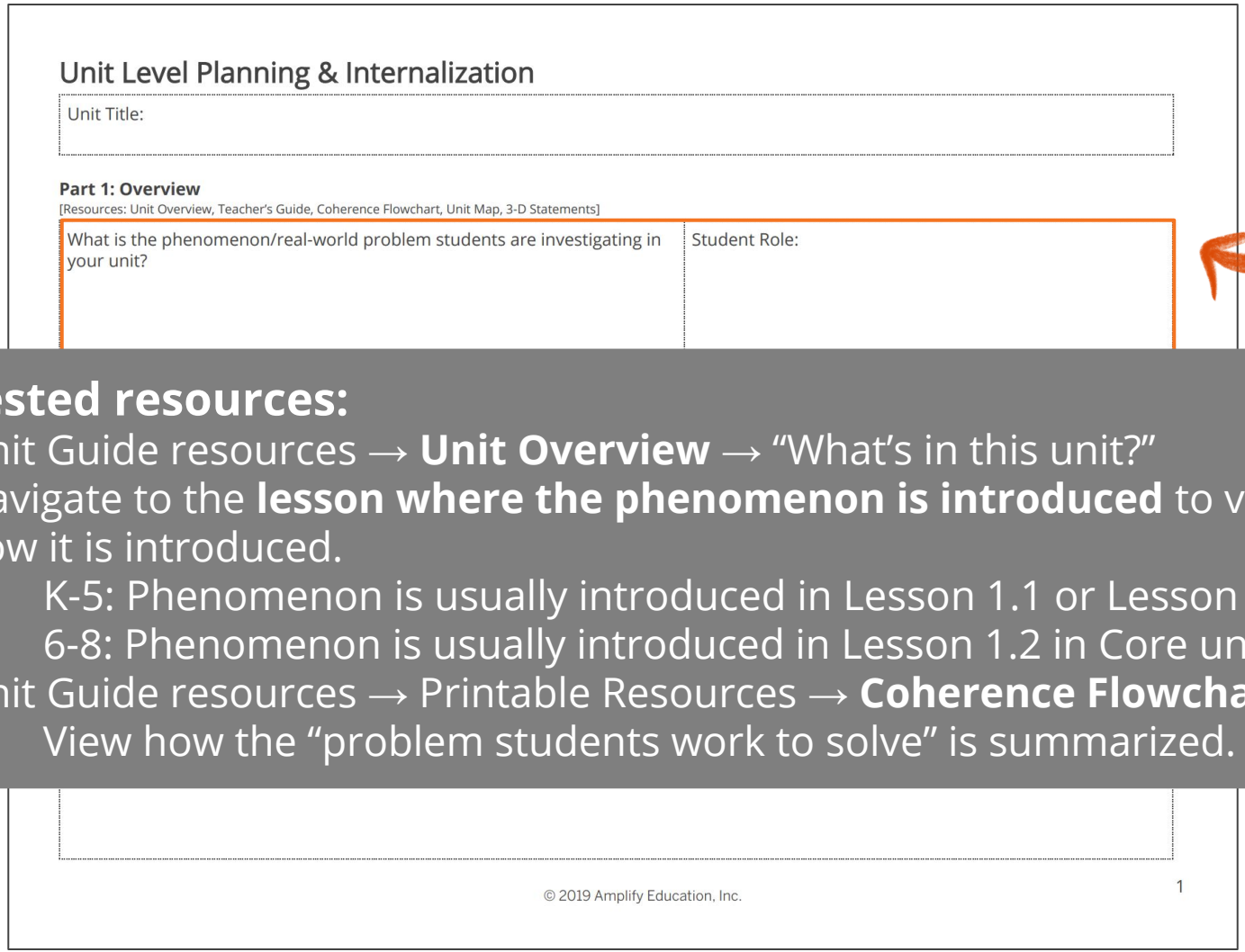
Plan for the day

- Framing the day
  - Welcome and introductions
  - Anticipatory activity
- Targeted Implementation Reflection
  - Digitally-enhanced learning
    - Remote/Hybrid Resources Utilization
  - Reaching diverse learners
    - Utilizing Embedded Assessments
    - Culturally Linguistically Responsive Teaching
  - Science & Literacy
    - Accessing Complex Texts
    - Supporting Academic Discourse
    - Writing In Science
- **Guided Planning**
  - **Unit internalization protocol**
  - **Chapter & Lesson-level internalization**
    - **Planning & pacing**
- Closing
  - Reflection & additional resources
  - Survey

Guided Planning materials

- Internalization guide (interactive pdf)
- Unit Internalization visual
  - Digital visual
    - Navigate to Jamboard to create a digital visual
  - Physical visual
    - Gather paper, tape, post-its (different colors if possible)





Page 5

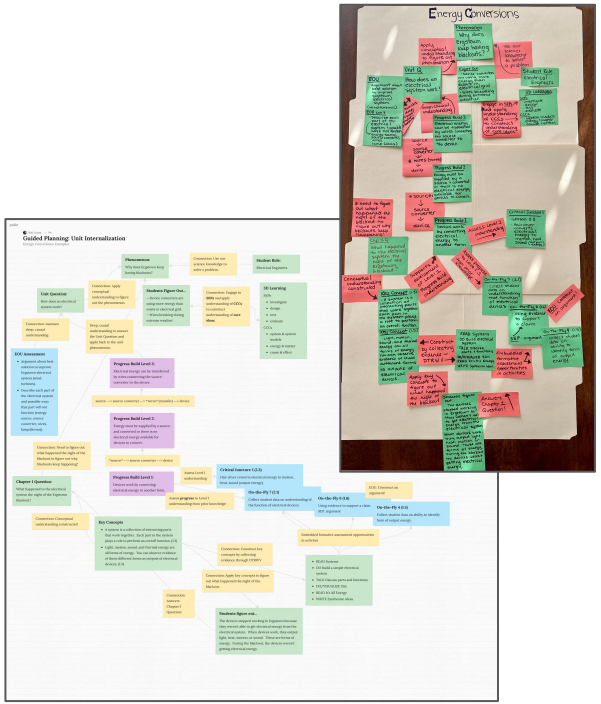
Suggested resources:

- Unit Guide resources → **Unit Overview** → "What's in this unit?"
- Navigate to the **lesson where the phenomenon is introduced** to view how it is introduced.
  - K-5: Phenomenon is usually introduced in Lesson 1.1 or Lesson 1.2
  - 6-8: Phenomenon is usually introduced in Lesson 1.2 in Core units.
- Unit Guide resources → Printable Resources → **Coherence Flowcharts**
  - View how the "problem students work to solve" is summarized.

Creating your visual!

How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - 1. Phenomenon or problem students are working to solve
  - 2. Student role



Unit Level Planning & Internalization

Unit Title:	

Part 1: Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

What is the phenomenon/real-world problem students are investigating in your unit?	Student Role:
Unit Question:	Relationship between the Unit Phenomenon and Unit Question:

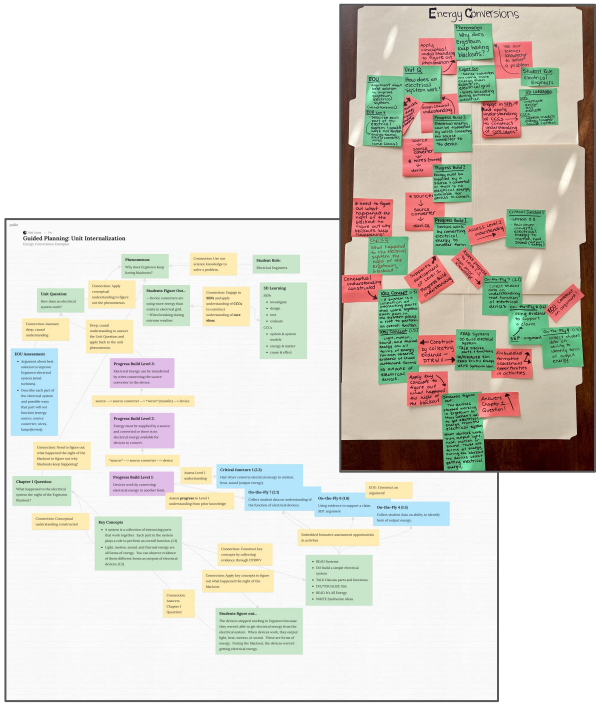
Suggested resources:

- Unit Guide resources → **Lesson Overview Compilation**
- Unit Guide resources → Printable Resources → **Print Materials (11x17)**

Creating your visual!

How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - 1. Unit Question
  - 2. Relationship between the Unit Phenomenon and the Unit Question



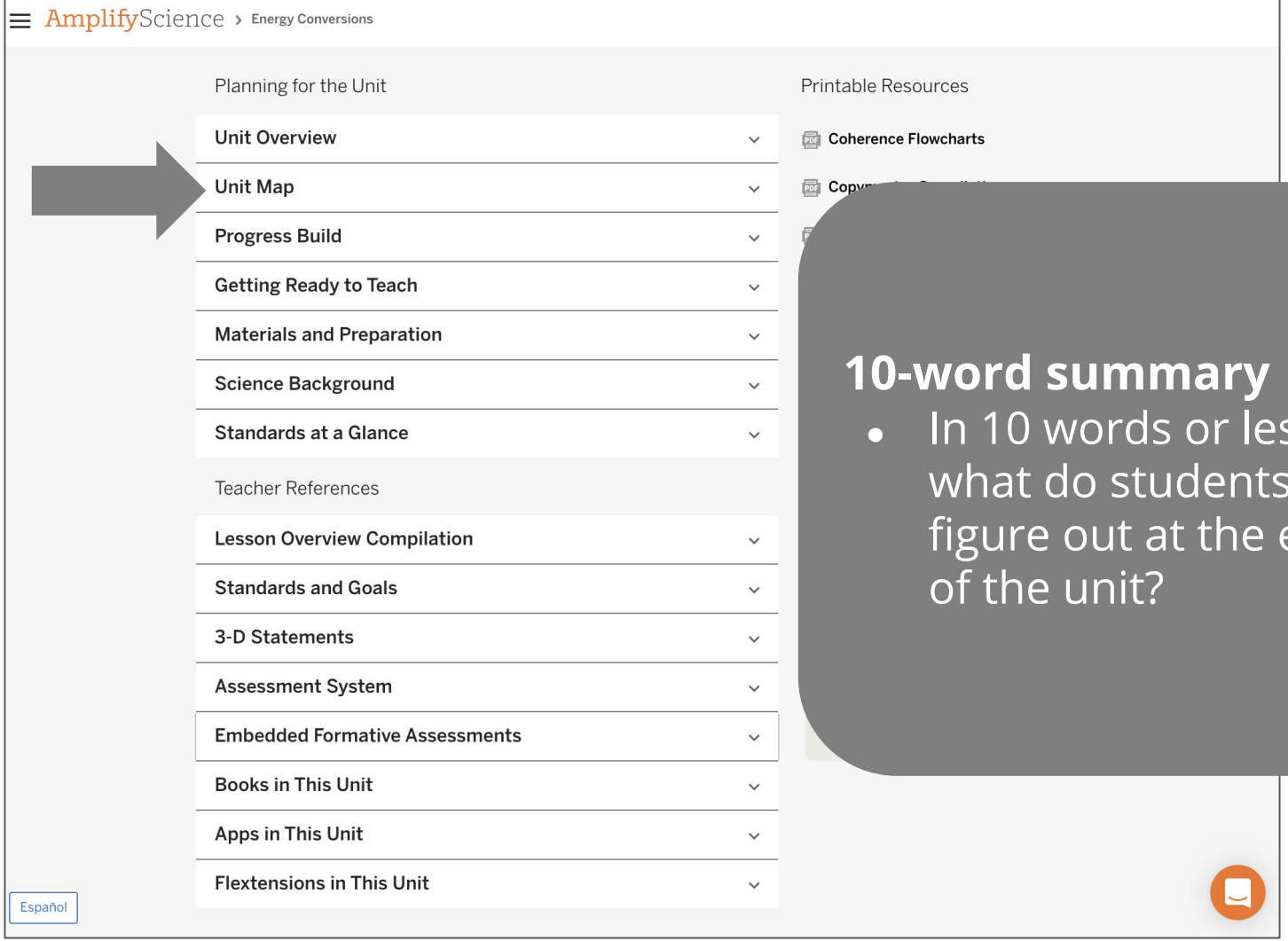
Unit Level Planning & Internalization

Unit Title:

Part 1: Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

What is the phenomenon/real-world problem students are investigating in your unit?	Student Role:
Unit Question:	Relationship between the Unit Phenomenon and Unit Question:
By the end of the unit, students figure out...	
How do students engage with three-dimensional learning to figure out the phenomenon/real-world problem in your unit?	



10-word summary

- In 10 words or less, what do students figure out at the end of the unit?

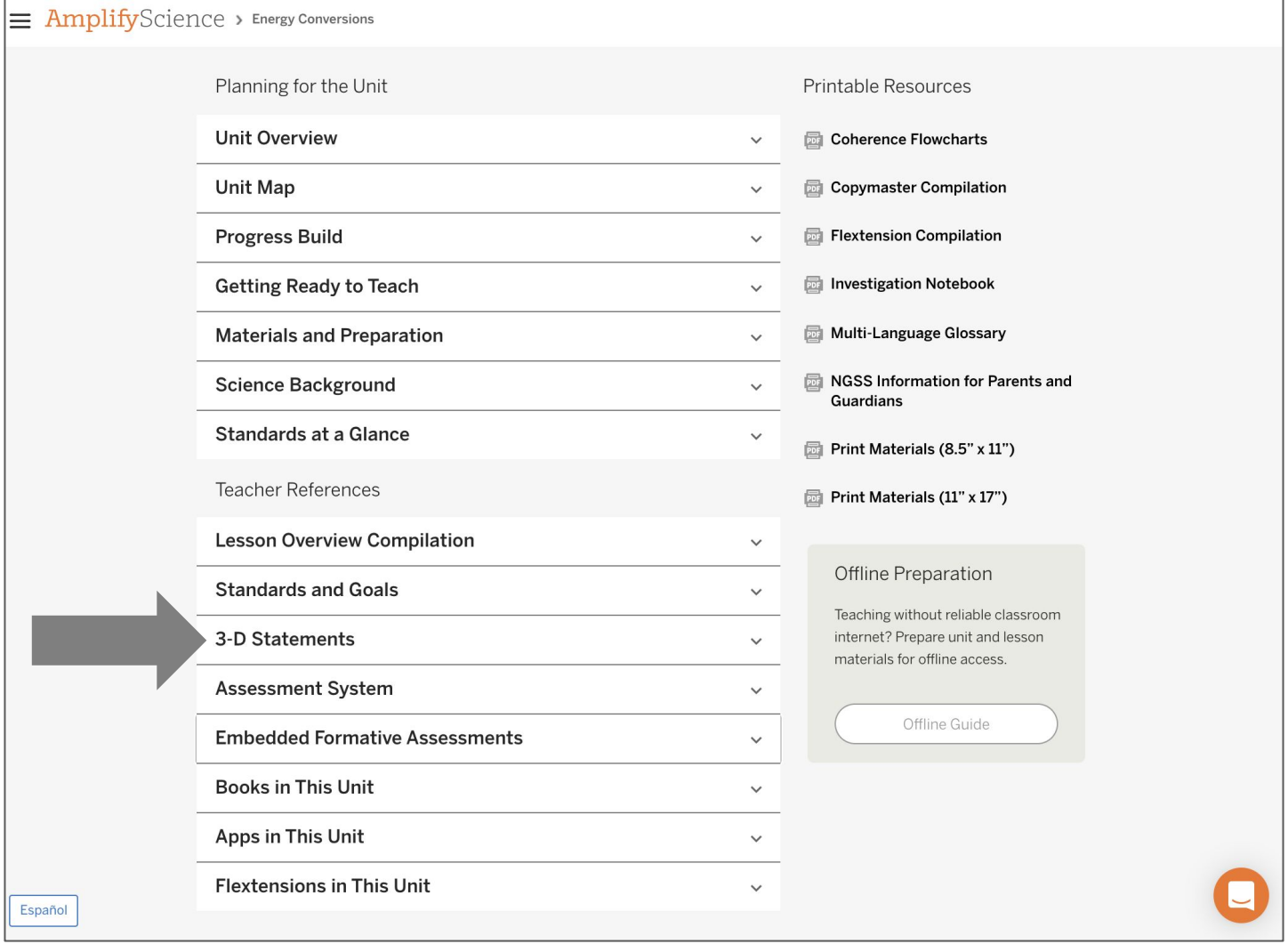
Unit Level Planning & Internalization

Unit Title:

Part 1: Overview

[Resources: Unit Overview, Teacher's Guide, Coherence Flowchart, Unit Map, 3-D Statements]

What is the phenomenon/real-world problem students are investigating in your unit?	Student Role:
Unit Question:	Relationship between the Unit Phenomenon and Unit Question:
By the end of the unit, students figure out...	
How do students engage with three-dimensional learning to figure out the phenomenon/real-world problem in your unit?	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Planning for the Unit
Unit Overview
Unit Map
Progress Build
Getting Ready to Teach
Materials and Preparation
Science Background
Standards at a Glance
Teacher References
Lesson Overview Compilation
Standards and Goals
3-D Statements
Assessment System
Embedded Formative Assessments
Books in This Unit
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Flextensions in This Unit
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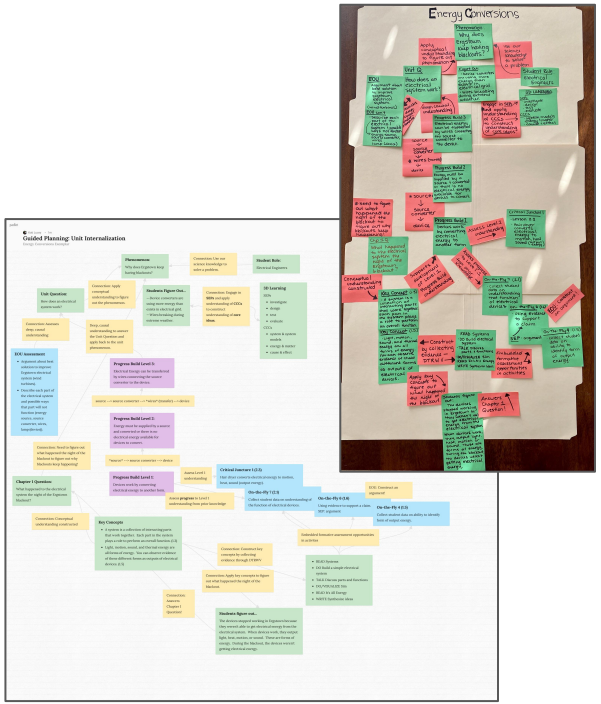
Teaching without reliable classroom internet? Prepare unit and lesson materials for offline access.
Offline Guide

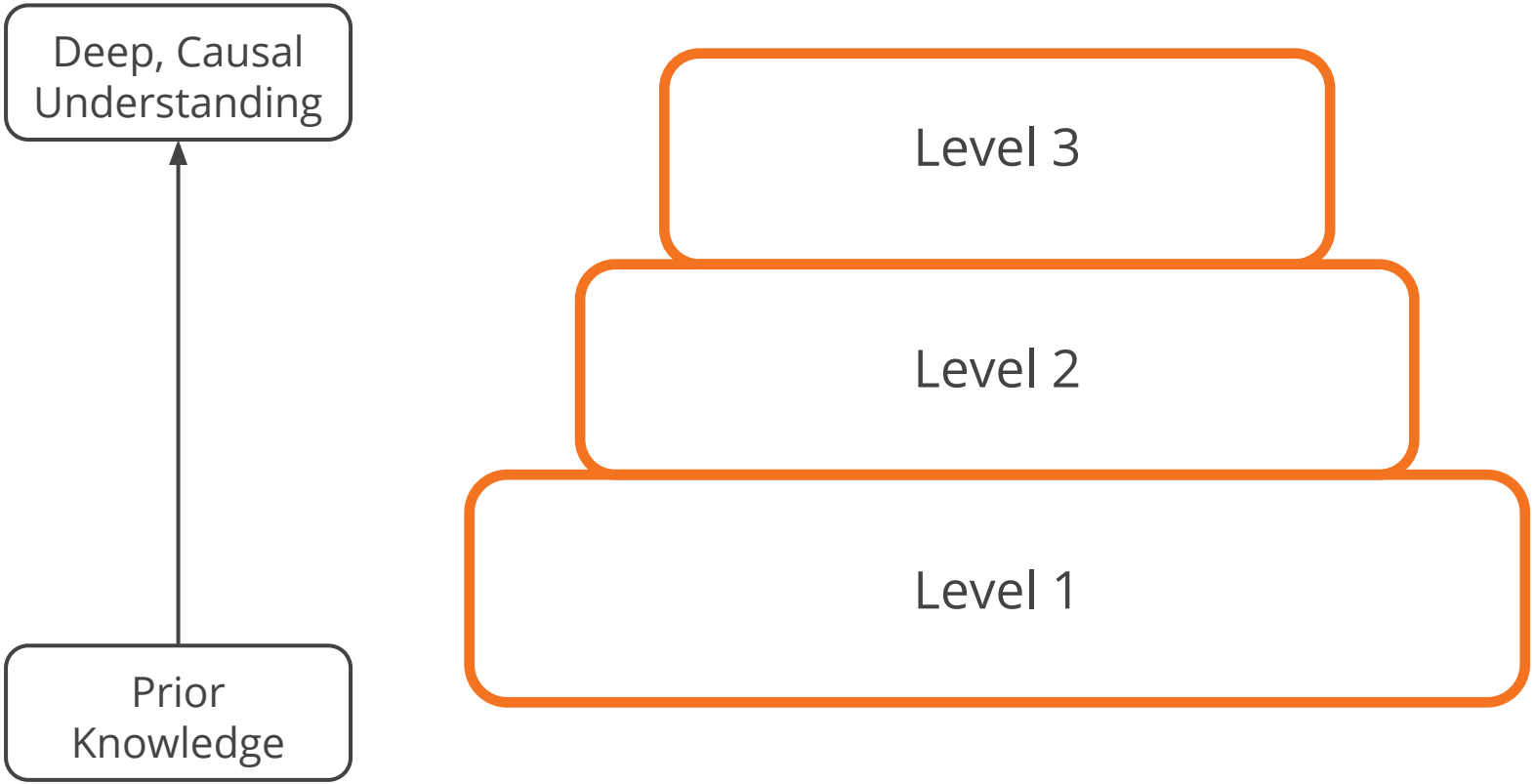
Creating your visual!

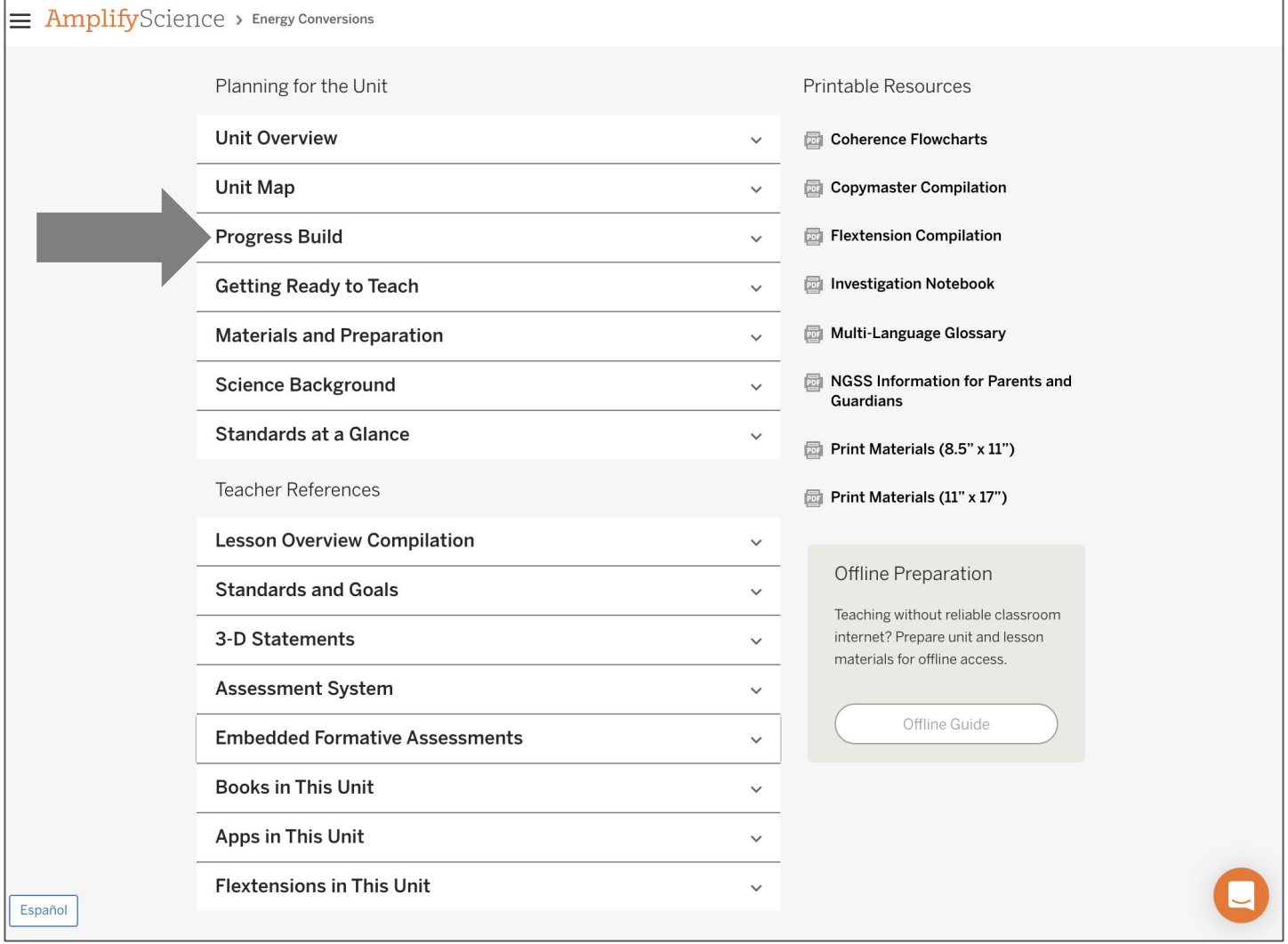
How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - 1. 10-word summary of what students figure out at the end of the unit
  - 2. How students engage in 3-D learning to figure out the phenomenon
  - 3. Add connections that explain the relationship between what students figure out and:
    - 3-D learning
    - The Unit Question
    - Anchor phenomenon



Progress Build: A unit-specific learning progression

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Planning for the Unit
Unit Overview
Unit Map
Progress Build
Getting Ready to Teach
Materials and Preparation
Science Background
Standards at a Glance
Teacher References
Lesson Overview Compilation
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Assessment System
Embedded Formative Assessments
Books in This Unit
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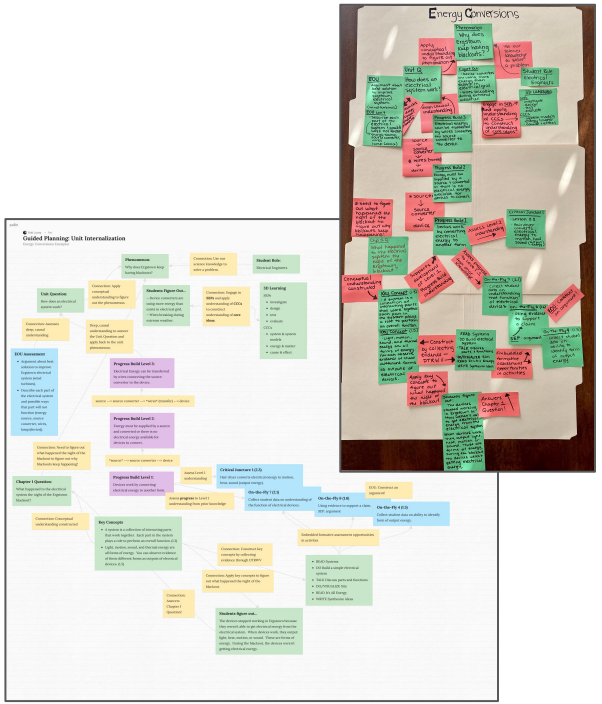
Creating your visual!

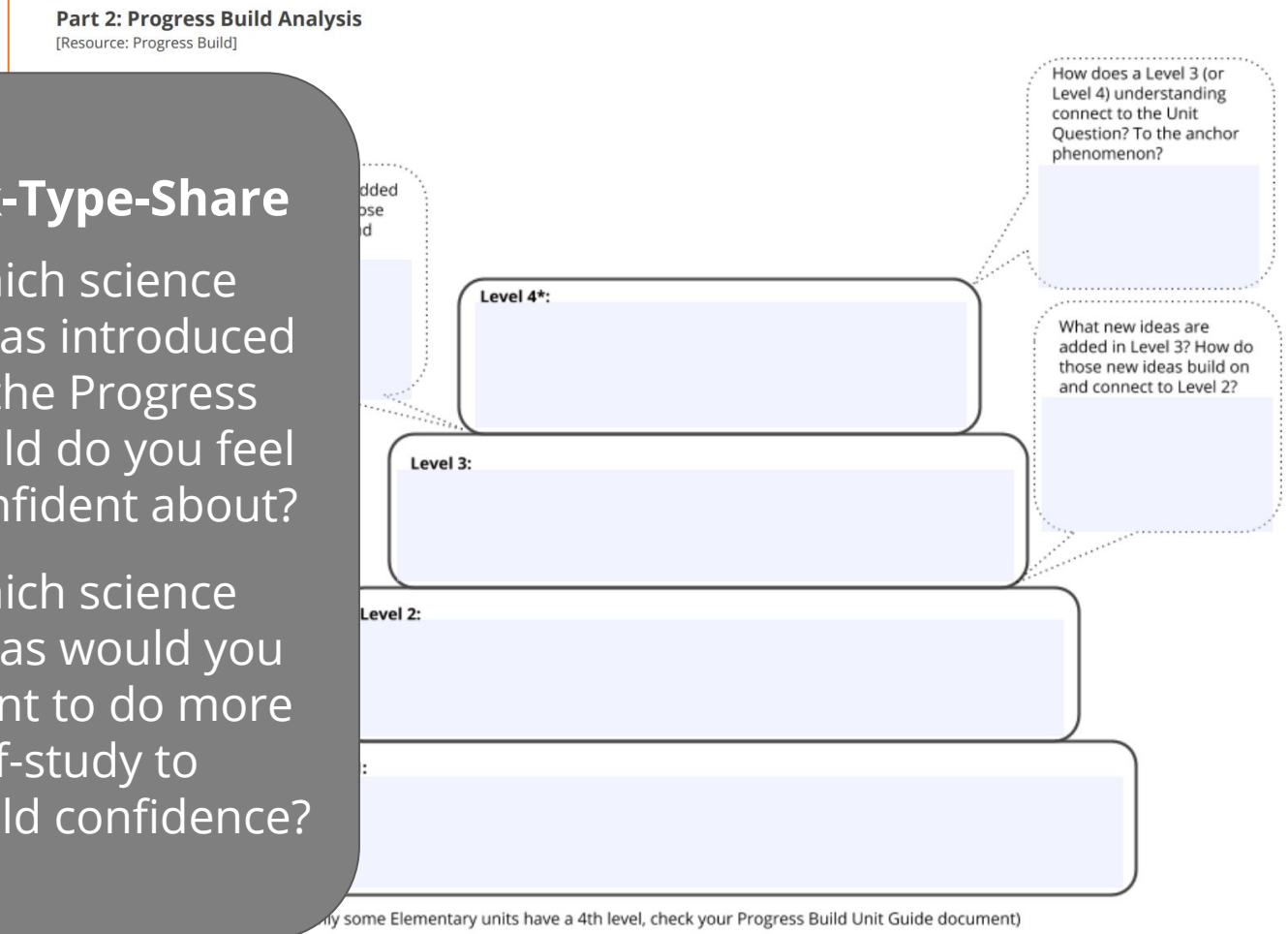
How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - 1. Progress Build levels
  - 2. Connections between levels

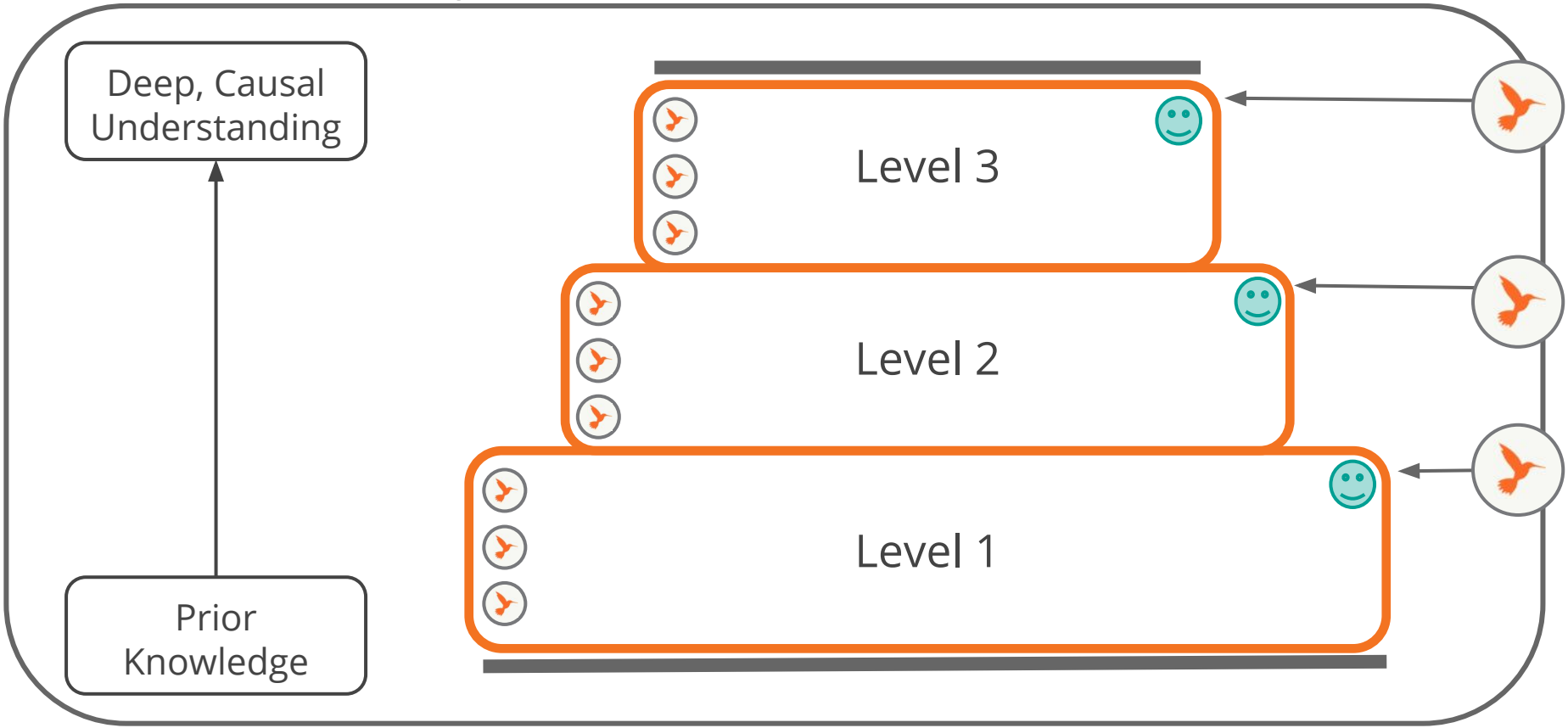


Think-Type-Share

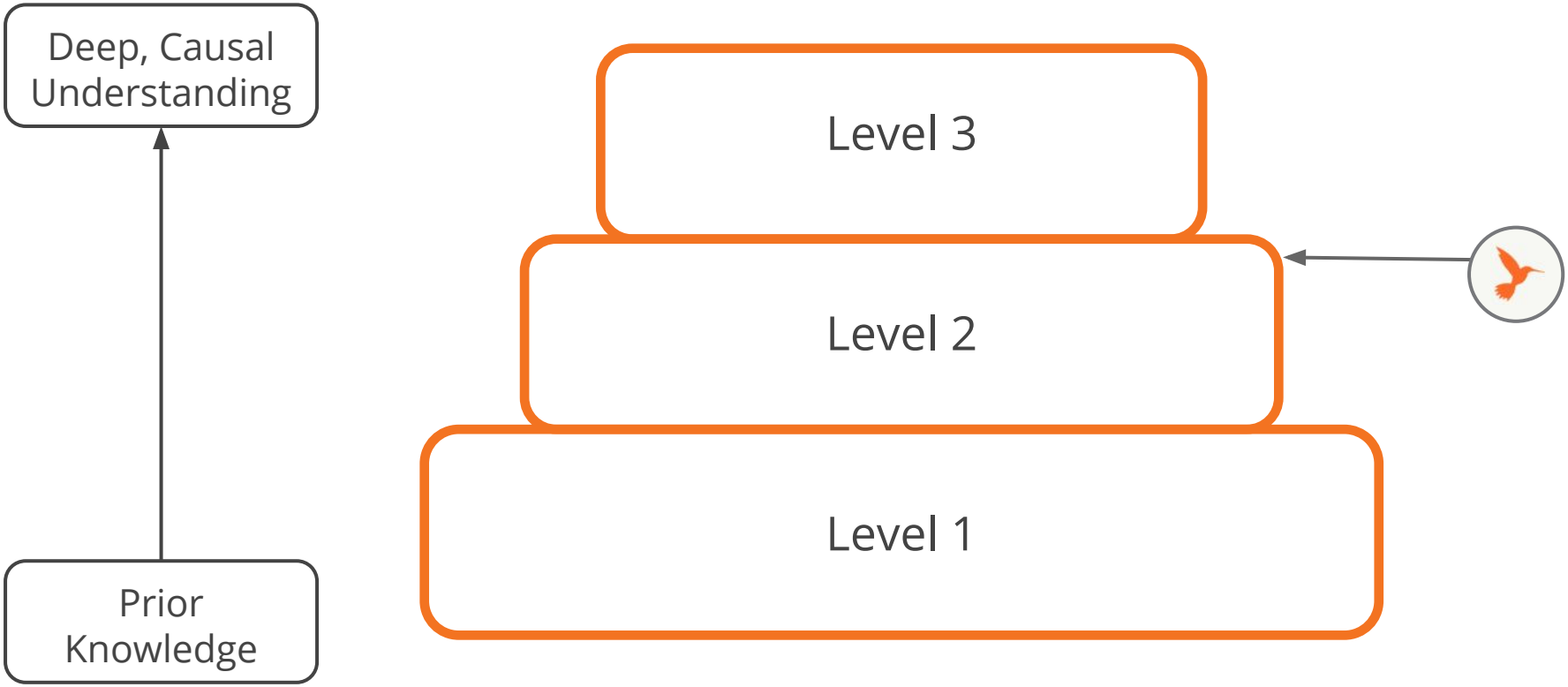
- Which science ideas introduced in the Progress Build do you feel confident about?
- Which science ideas would you want to do more self-study to build confidence?



Assessment System



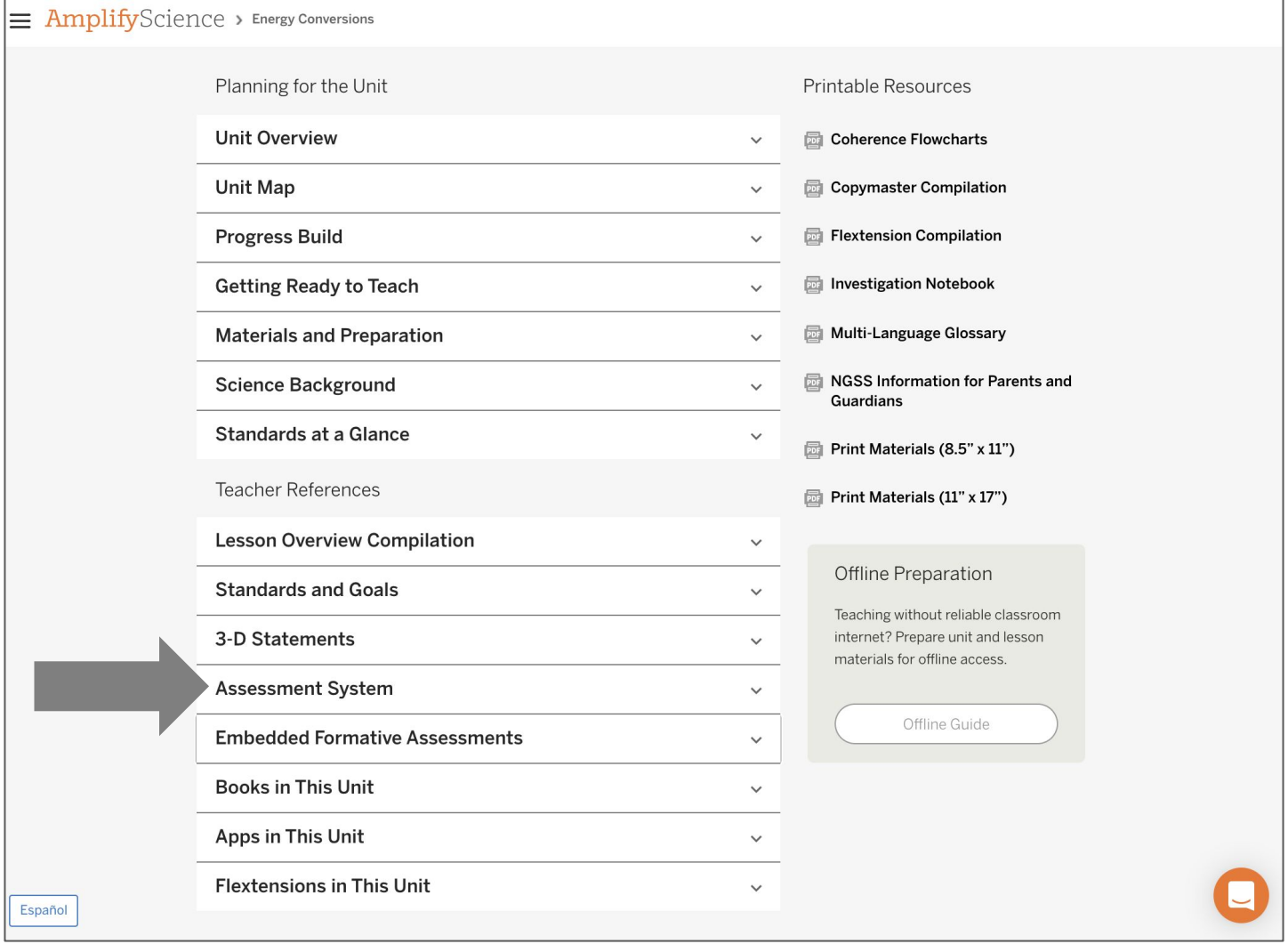
6-8 Critical Juncture Assessment



Part 4: Critical Juncture Analysis

[Resources: Assessment System, Embedded Formative Assessments, Progress Build, Coherence Flowcharts, Digital or Print Teacher's Guide]

Critical Juncture Assessment located:	Assessment Focus:
Take the Critical Juncture Assessment (K-5: Part 1 only if your assessment has multiple parts; 6-8: Open response questions only). Record your exemplar response(s) to the written (or oral for grades K-1) prompt(s) and any notes/annotations below:	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Planning for the Unit
Unit Overview
Unit Map
Progress Build
Getting Ready to Teach
Materials and Preparation
Science Background
Standards at a Glance
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Lesson Overview Compilation
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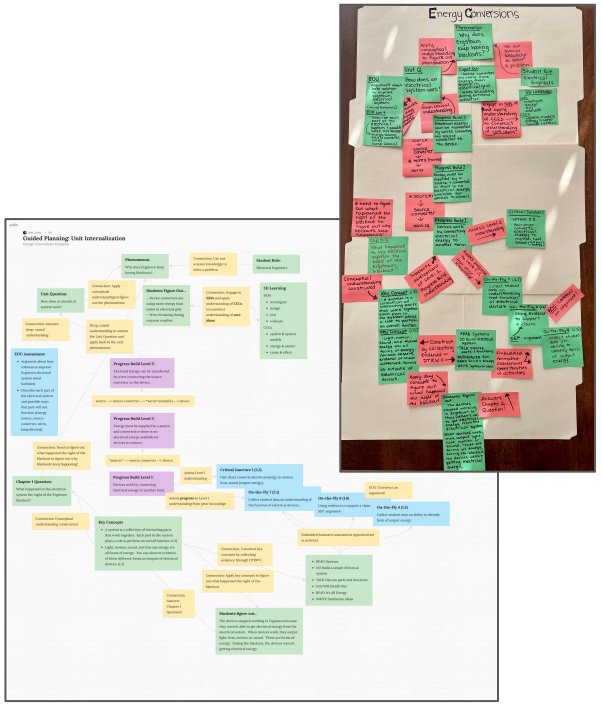
What is the relationship between conceptual understanding described in the Progress Build and the Critical Juncture Assessment?

When during the lessons leading up to the Critical Juncture Assessment are there critical opportunities to collect data on student thinking and learning?

Creating your visual!

How is the unit designed to support students to figuring out the unit phenomenon?

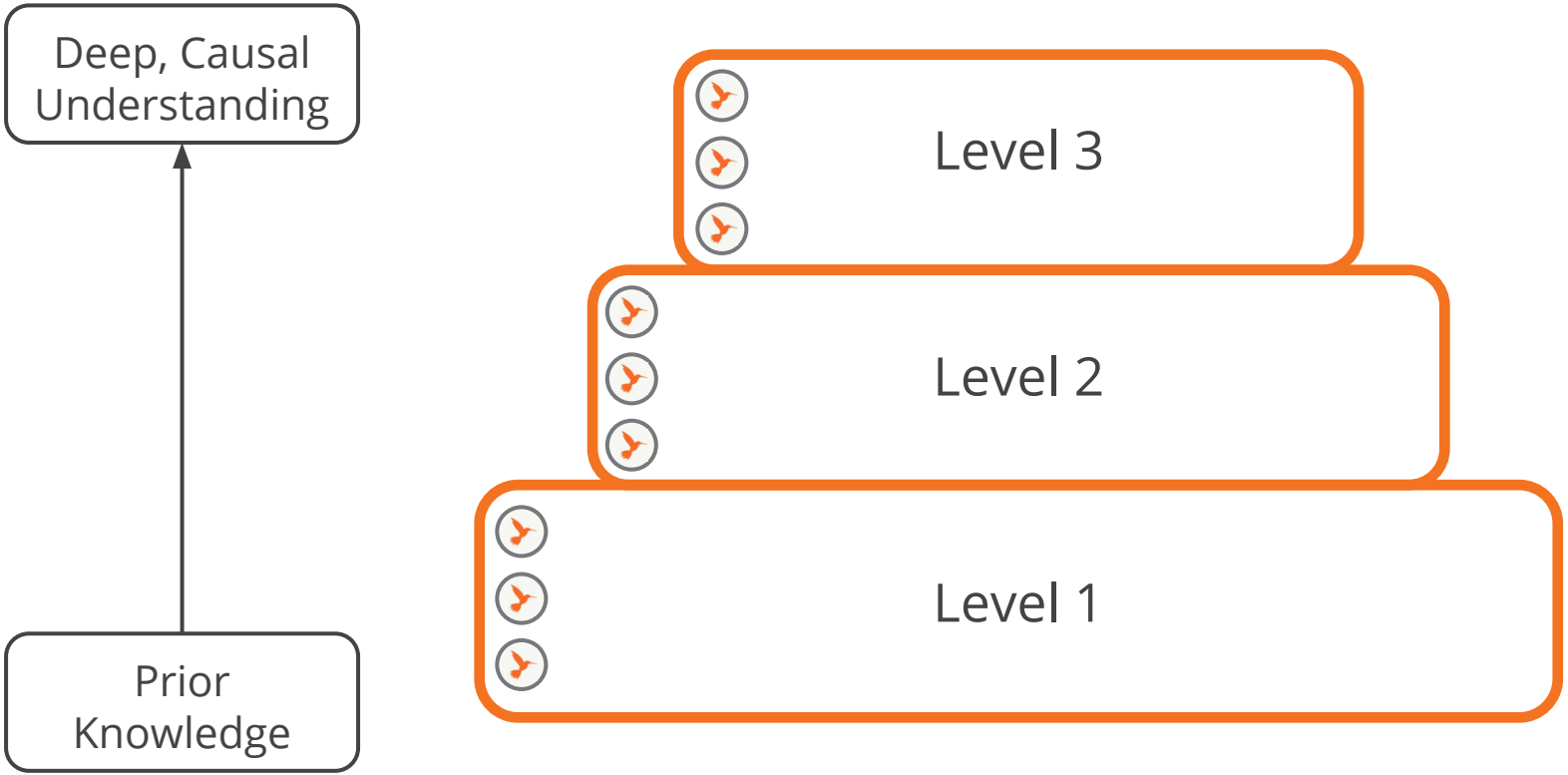
- Add to your visual:
  - Relationship between the conceptual understanding described in the Progress Build and Critical Juncture Assessment

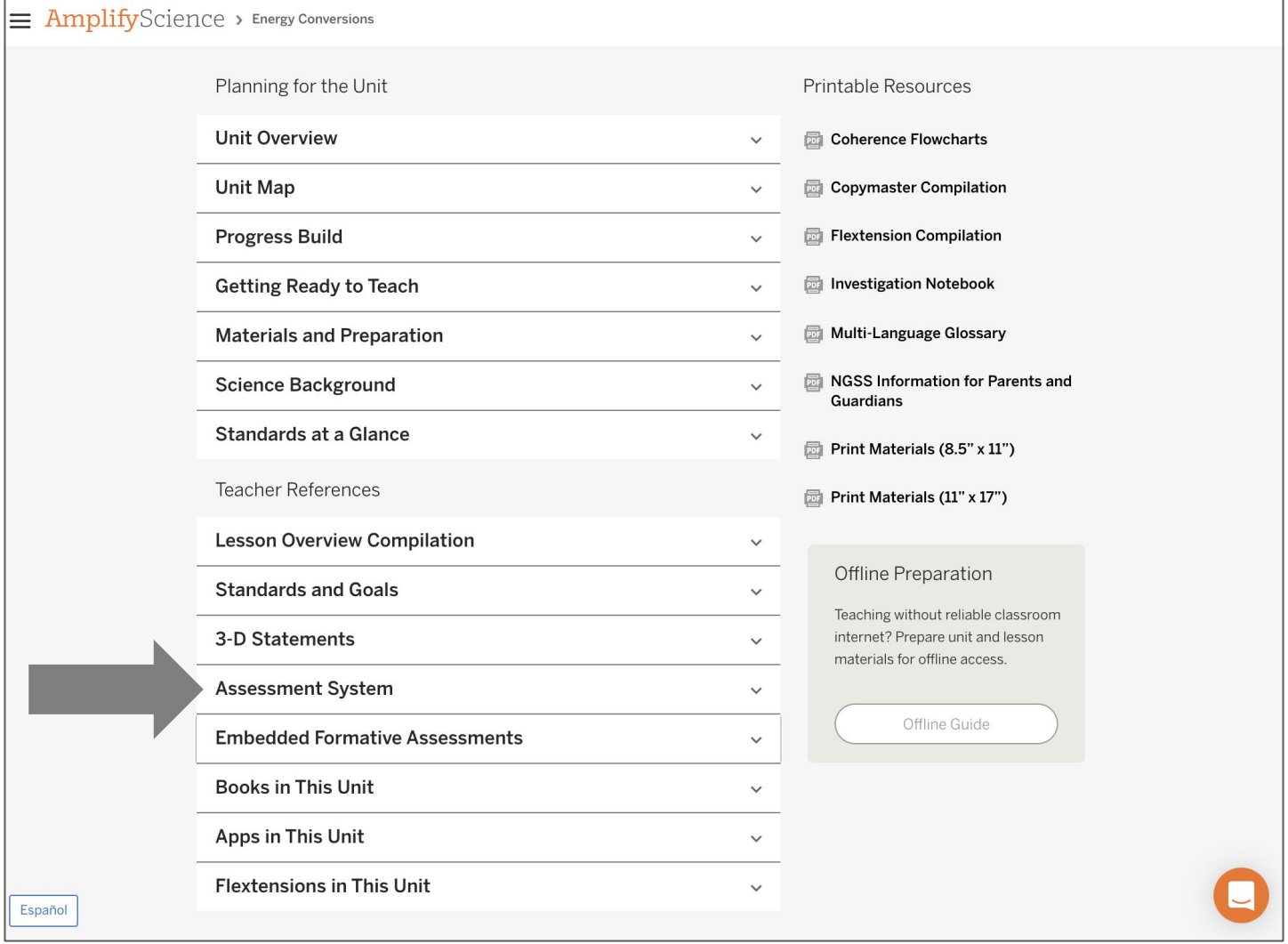


What is the relationship between conceptual understanding described in the Progress Build and the Critical Juncture Assessment?

When during the lessons leading up to the Critical Juncture Assessment are there critical opportunities to collect data on student thinking and learning?

On-the-Fly Assessments

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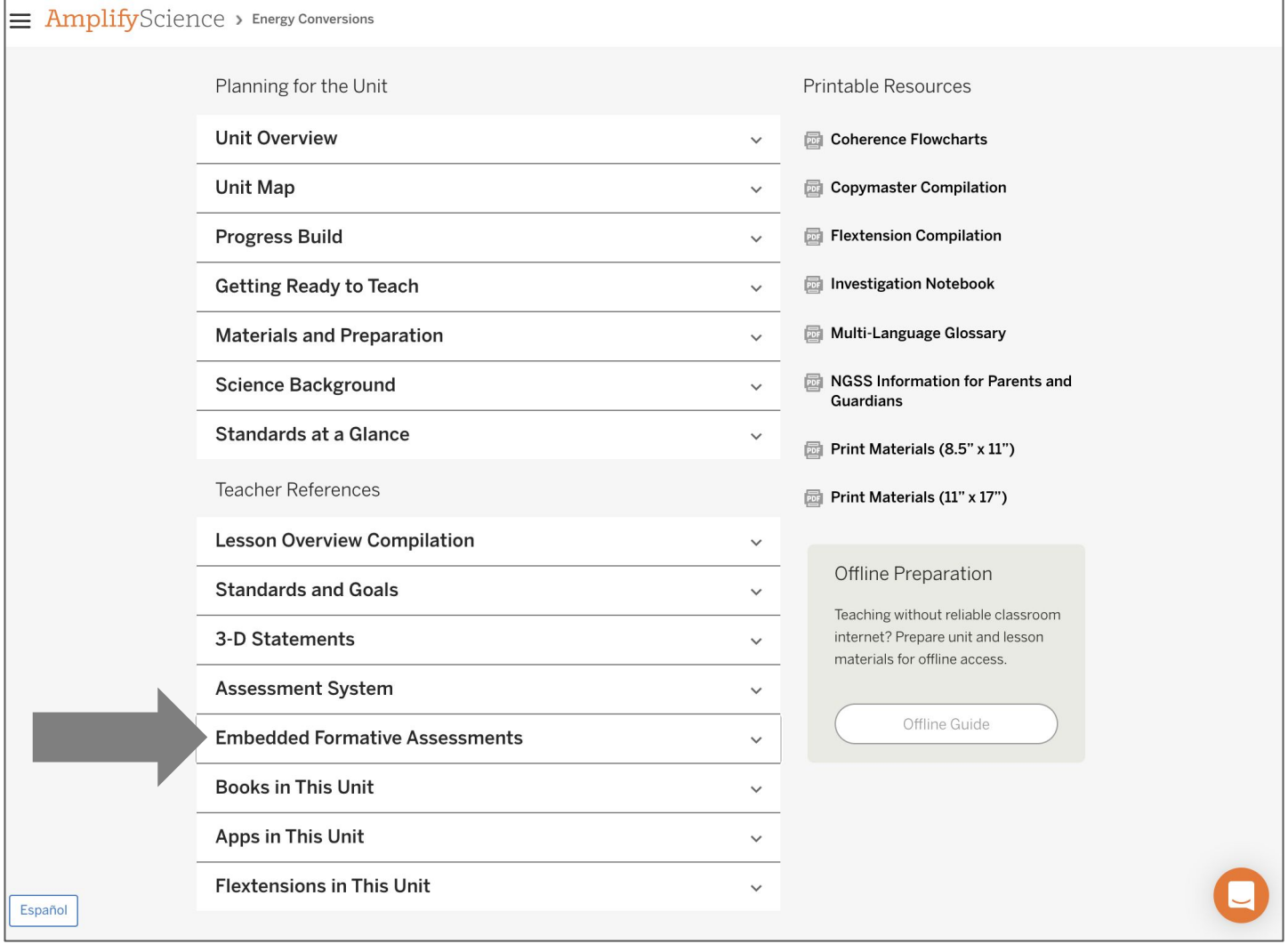
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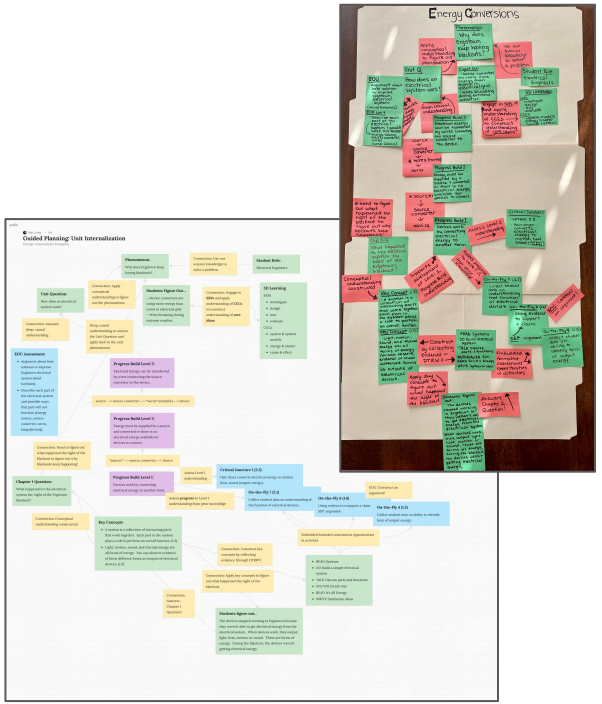
Creating your visual!

How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - 1. Embedded formative assessment opportunities
  - 2. Add connections from the assessment opportunities back to the Critical Juncture, Progress Build, 3-D learning, and the anchor phenomenon



Part 5: Chapter 1 Analysis

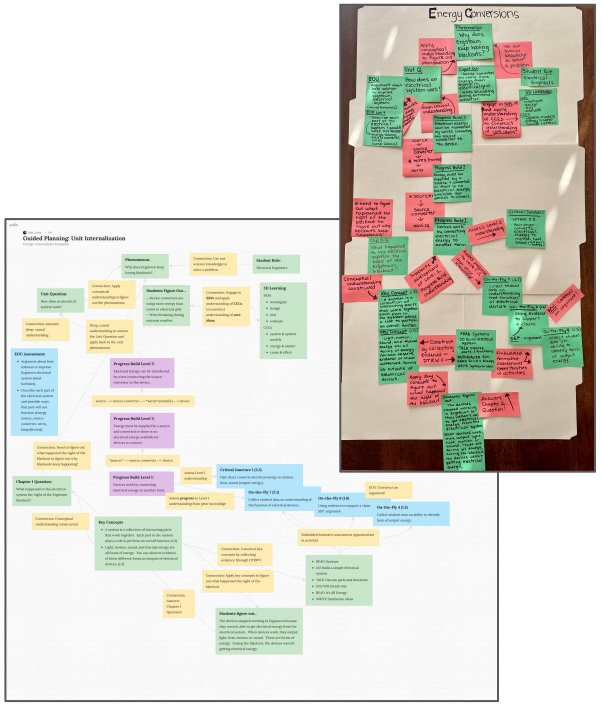
[Resources: Assessment System, Progress Build, Coherence Flowcharts, Digital or Print Teacher's Guide]

What is the Chapter Question?	
How does the Chapter Question connect back to the anchor phenomenon?	
What key concepts do students construct in this chapter?	
How are students constructing an understanding of these concepts? *Consider 3D Learning and the Multimodal Approach of Do-Talk-Read-Write-Visualize	
How do the key concepts constructed in Chapter 1 connect to the Progress Build?	
How do students apply the key concepts to the phenomenon/problem to answer the Chapter 1 question? *Use the Coherence Flowchart to find the explanation to the Chapter 1 question.	

Creating your visual!

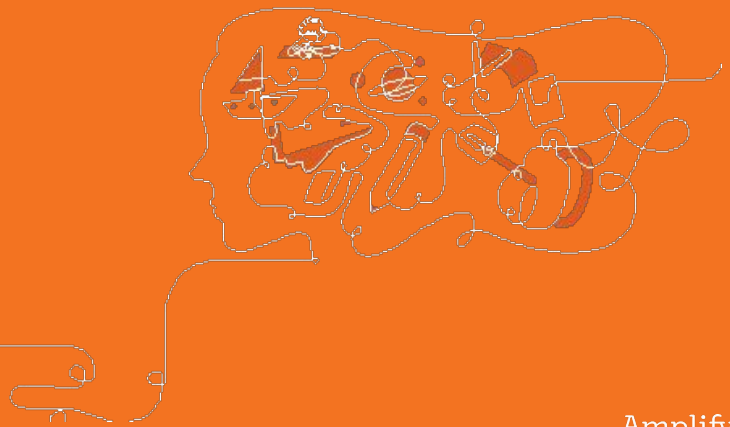
How is the unit designed to support students to figuring out the unit phenomenon?

- Add to your visual:
  - How is Chapter 1 designed to support students in starting to figure out the phenomenon?



Questions?

Share your visual!



Use your visual & your prior reflections to inform instructional planning!

Choose the option that best supports you in **planning to teach.** Refer back to your **self-inventory** to guide your planning **focus**:

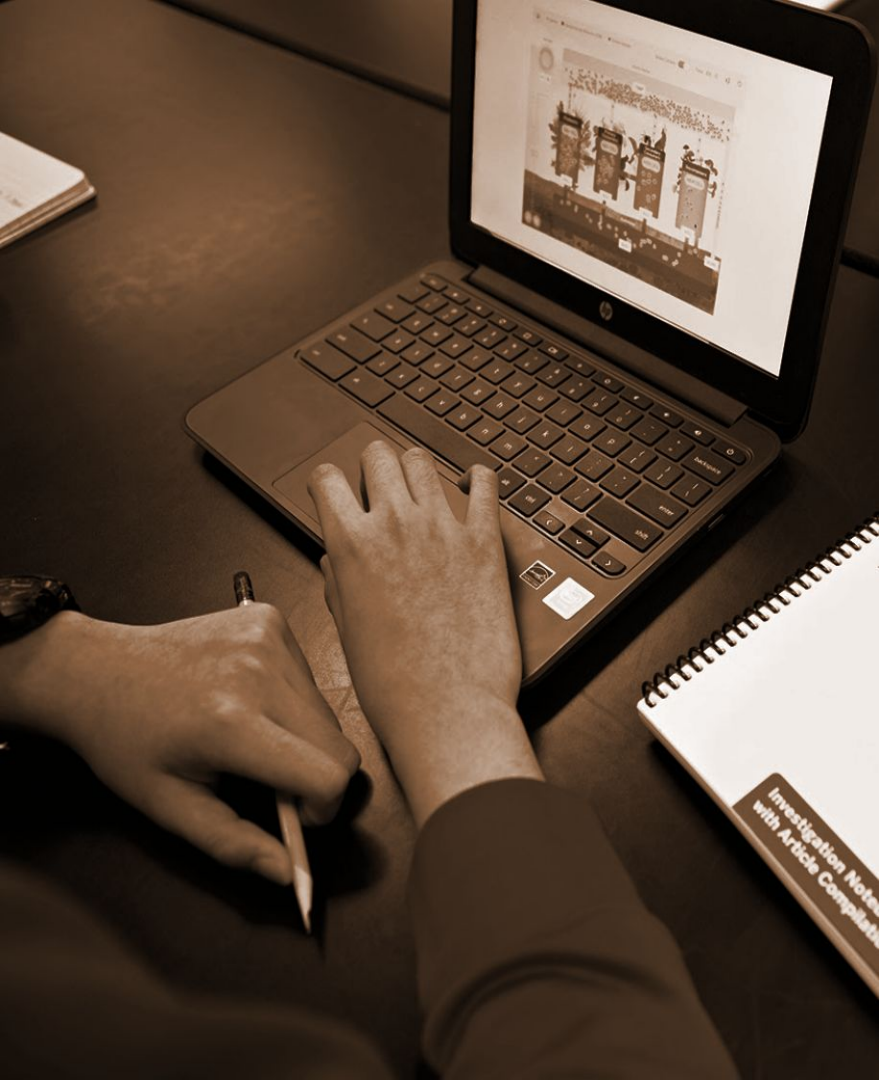
1. Complete the Unit Pacing Planning on **pages 11-13.**
2. Complete your Chapter 1 lesson plans on **pages 14-17.**
3. Use the Unit Level Planning & Internalization Guide to analyze Chapters 2-5 on **pages 18-21**.

Debrief & reflection

- Share one **key-takeaway** from your breakout room planning work-time.

- Share one **new insight** you've gained from planning with regard to your **target areas** of **strength** and **support** you identified earlier.

Questions?



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    - Planning & pacing
- **Closing**
  - **Reflection & additional resources**
  - **Survey**

3-2-1 Reflection

3	**Strategies to take away**

2	**Things I learned**

1	**Question I still have**

Revisiting our objectives

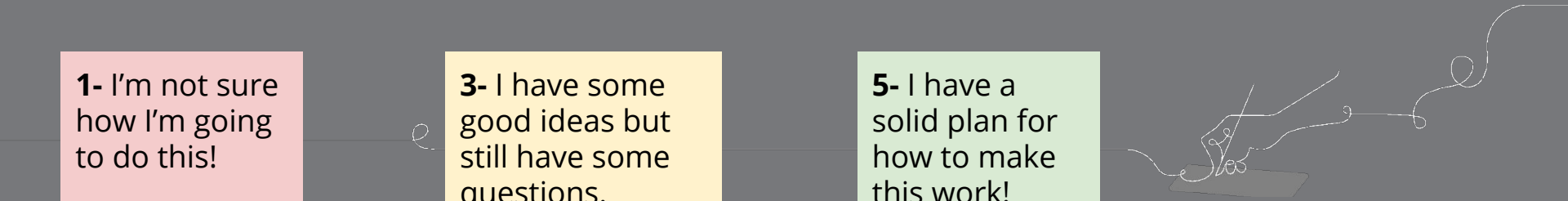
Do you feel ready to…

- Reflect on you implementation of Amplify Science in the targeted areas of digitally-enhanced learning, supporting diverse learners, & disciplinary literacy?
- Utilize these reflections to begin targeted planning at the unit & lesson level for the upcoming school year?

1- I'm not sure how I'm going to do this!

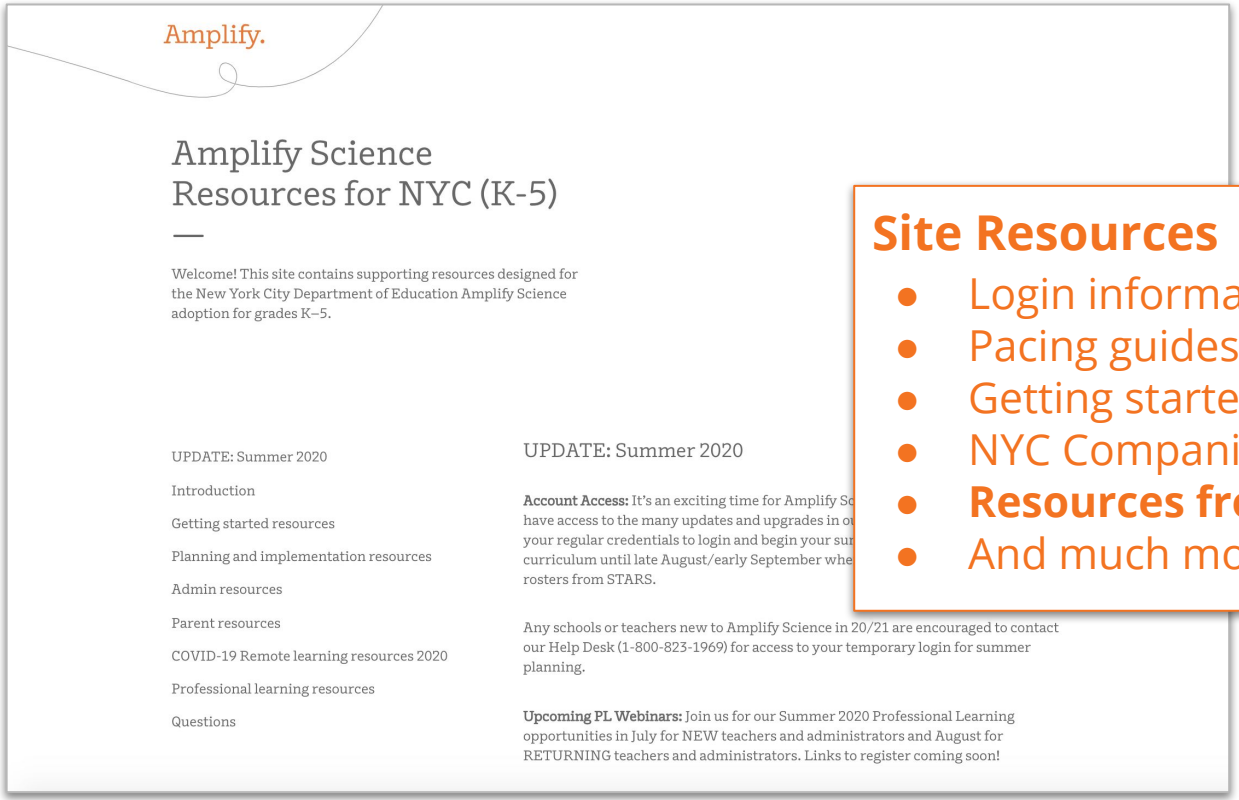
3- I have some good ideas but still have some questions.

5- I have a solid plan for how to make this work!



New York City Resources Site

https://amplify.com/amplify-science-nyc-doe-resources/



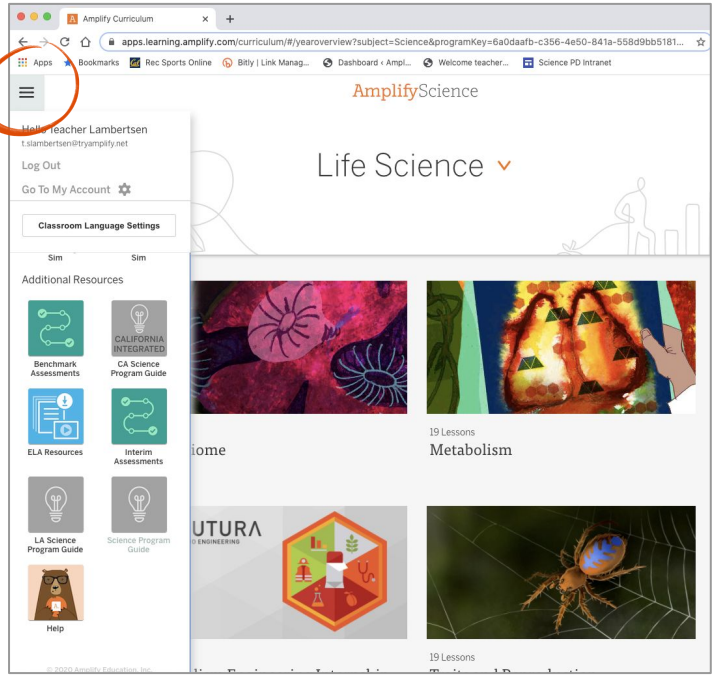
Site Resources

- Login information
- Pacing guides
- Getting started guide
- NYC Companion Lessons
- **Resources from PD sessions**
- And much more!

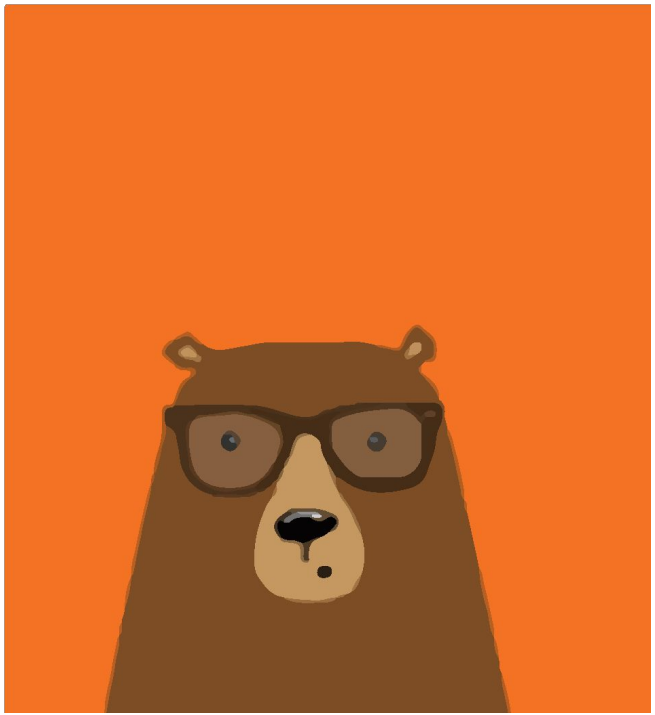
Amplify Science Program Hub

A hub for Amplify Science resources

- **Videos and resources to continue getting ready to teach**
- Amplify@Home resources
- Keep checking back for updates



Additional Amplify resources



Program Guide

Glean additional insight into the program's structure, intent, philosophies, supports, and flexibility.

https://my.amplify.com/programguide/content/national/welcome/science/

Amplify Help

Find lots of advice and answers from the Amplify team.

my.amplify.com/help

Additional Amplify Support

Customer Care

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-7PM EST.

scihelp@amplify.com

800-823-1969

Amplify Chat

When contacting the customer care team:

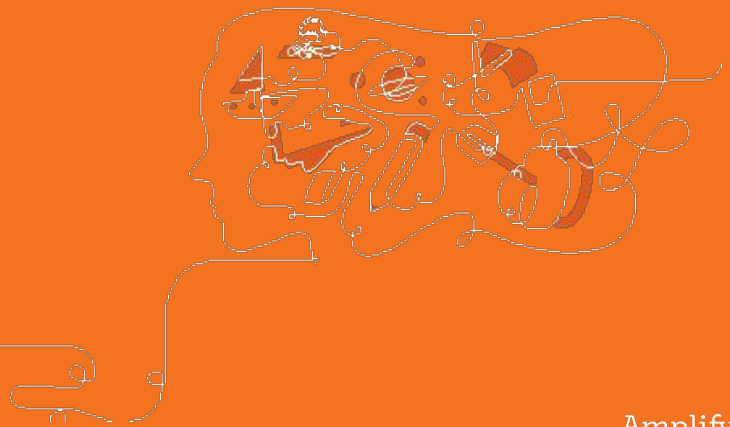
- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows, laptop).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible.
- Copy your district or site IT contact on emails.


Final Questions?

Please provide us feedback!

URL: https://www.surveymonkey.com/r/BY56SBR

Presenter name:



Amplify.

Thank you & be well!