BUSD Science Adoption

Report to Board Members
May 2021
Presented by
Tami Zylla, Valyssa Roberts, Faith Bletterman,
Michael Rooks and Jennifer Nguyen

BUSD NGSS Timeline

Time	Events
2014-2018	BUSD created an NGSS Implementation Team (K-12), and a NGSS 6-12 Leadership Team
Summer 2018	Science TOSA position created
Fall 2018	HS started NGSS work by creating an NGSS aligned instructional unit
2018-2019 SY	TOT Elementary NGSS PD, and 6-12 NGSS PD
2018-2021	K-8 using Amplify as NGSS Gap material until Adoption
Jan 2019	Representatives from K-12 attended the LACOE Science Materials Fair
Spring 2019	● Pilot option programs delivered presentation to ES pilot teachers, and all secondary science teachers ● Programs were selected for piloting
Fall 2019	● ES piloted: Amplify and Inspire Science ● MS piloted: Amplify, STEMscopes, and Inspire Science ● HS piloted: Discovery Education and STEMscopes
Spring 2020	Piloting was complete and recommendations were made
2020-2021 SY	Bridge material was used: - Amplify (K-8) - STEMscopes (9-12)
Spring 2021	Adoption recommendations were revisited

Evaluation and Adoption Process

- A team of teachers (K-12) went to the LACOE Science Materials Fair and evaluated programs on a Google Form in 2019
- The top programs for K-5, 6-8, and 9-12 from the materials fair were asked to do an hour presentation for the piloting teachers
- During the presentations teachers filled out an evaluation form
- Based on the evaluations, the top 2 programs (3 for MS) were selected for piloting
- Teachers piloted the programs in the fall semester of 2019
- Piloted programs were each evaluated

Pilot Participants

Teachers	Number	Piloted Programs
Elementary K-5 *(2 per site, 1 lower grade and 1 upper grade including 2 dual teachers)*	20	• Amplify • Inspire Science
Middle School 6-8 *(All 6-8 science teachers including SpEd teachers)*	22	• Amplify • Inspire Science • STEMscopes
High School 9-12 (All HS school science teachers including SpEd teachers)	23	• Discovery Ed • STEMscopes
District Administrators	3	
Science TOSA	1	

BUSD CTF Meeting

Citizens' Task Force reviewed and validated the adoption process regarding NGSS aligned curriculum for K-12.

Programs

- ES Recommendation: Inspire Science

- MS Recommendation: Amplify

- HS Recommendation: STEMscopes

Pilot Teacher Testimonials

- Faith Bletterman, 1st grade teacher at Ramona Elementary School (Inspire)
- Michael Rooks, 7th grade teacher at Bellflower Middle School (Amplify)
- Jennifer Nguyen, Biology teacher at Bellflower High School (STEMscopes)

Inspire Science

California Inspire Science

Some highlights for the students…..

- The students were given colorful engaging student editions.
- There were leveled readers to go with each unit of study.
- Science Read Alouds
- Investigator Articles
- Collaboration Kits

Student Digital Resources

- The printed books included digital versions with interactive features, including audio and text highlighting.
- Video demonstrations of the hands-on activities.
- Science content videos.
- Text Read aloud and Highlighting Features.

Phenomena-Driven Learning Modules

- Students would investigate the lesson phenomenon
- They gathered pieces of the puzzle to solve and explain the module phenomenon

Phenomena-Driven Learning Modules continued

- 3 to 4 lessons
- Module Wrap Up (Revisiting the phenomenon)

Inspire all students….

- Differentiation and ELD support.

Inspire All Students

Strategies to scaffold your instruction and plan for successful teaching for all students.

Differentiated Instruction

Module Concept Plants and animals need certain things to survive. People can observe how plants and animals live in places where they can find those things. Help students connect these key module concepts by providing multiple means of expression.

Approaching Level

Gather pictures of different kinds of plants and animals. Show students each picture and have them identify what it shows by saying plant or animal. Have students explain how they know.

On Level

Have each student choose a favorite wild animal. Ask them to think about where the animal lives. Direct students to draw a picture of the animal in its natural environment.

Beyond Level

Ask students what they need to stay healthy. (food, air, water, shelter) Lead a discussion about whether animals do or do not need these same things.

Advanced Learners and Gifted Learners

Instruction should focus on adding depth and complexity in student understanding of how using models and our own observations can help us learn more about the world.

DOK 3 Strategic Thinking

Have students revisit the investigations they carried out throughout the module to think about how they can investigate further questions. For example, what different animals would we see if our animal walk had been at night? Have them tell about a plan for further investigation.

DOK 4 Extended

Have students think about the aquarium model they built in the Module Wrap-Up. Have them think about how the model helps explain why certain plants and animals would live there. How could they change the model so that other animals, such as turtles or birds could live there?

Literacy Support: Using the Leveled Readers

Use the Leveled Readers to enable students to further develop their literacy skills through science.

- Fiction: Engages students in key concepts
- Nonfiction: Focuses on real world topics; Makes informational text accessible to all learners
- Also available in print and online

What People and Animals Need

Summary This book discusses the basic needs of people and animals.

When to Use Use the book in Lesson 2 to learn more about the needs of living things.

English Language Support

Graphic Organizers

Utilize charts and graphic organizers to help students understand and classify different items as they are introduced in the module, such as living and nonliving things, plant and animal needs, and types of environments. Encourage students to add examples in the form of pictures and words to the graphic organizer.

EMERGING

Illustrated Word Bank As new concepts are introduced, create a word wall with pictures and words in English (and the students' home languages, if desired). For example, when *Living Things* and *Nonliving Things* are introduced, write the headers on top of poster paper. Then have students find pictures of things that fall into those categories and add them to the poster. Write labels for the words in English (and the students' home languages, if desired) and have students add them to the poster.

EXPANDING

T-charts When new classifications are introduced, create a T-chart on chart paper. For example, when the lesson Plants and Animals is introduced, write the headers *Plants* and *Animals* at the top of the T-chart. Have groups think of items that will fit in each category. Invite groups to share their ideas and add them to the T-chart. Have students find pictures of the items in the T-chart and add them to the T-chart.

BRIDGING

Illustrated Web Diagram Use a web diagram to illustrate different concepts introduced in the module. For example, when reading the lesson Where Plants Live, write the phrase *Where Plants Live* in the middle circle. As students read about different places where plants live, have them write the names of different places where plants live in circles around the phrase. As students learn more about each concept, encourage them to add extensions to the outer circles that provide further details.

Cognates

Cognates are words in two different languages that share a similar meaning, spelling, and pronunciation. Review differences in spelling and pronunciation of these terms with your Spanish-speaking English learners.

plant planta	**animal** animal	**nutrient** nutriente
survive sobrevivir	**air** aire	**data** datos
observe observar	**prediction** predicción	

Language Building Resource

The online Language Building Resource is intended to support English language learning and vocabulary acquisition. Resources for each stage of the learning process are meant to appeal to different types of learning styles (kinesthetic, tactile, auditory, written, visual) and provide multiple modalities of repeated exposure.

Explore	Study	Review
Word Sort: Concept	Frayer Model	Concentration

Highlights for the teacher…..

- User friendly
- Pacing options to fit busy schedules

- Full track (45 mins. 5 days a week)
- FlexTrack A (30 mins. 5 days a week)
- FlexTrack B (30 mins. 3 days a week)

Professional learning…..

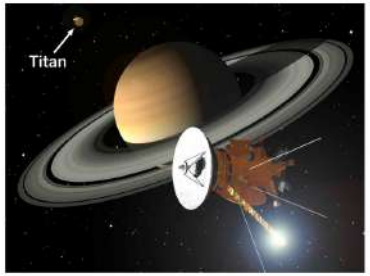
- Program Implementation Support
- Digital Platform Support

Amplify

Meets NGSS Standards

- Phenomena Based Instruction
- Storyline
- Explore first explain later
- Career Connections

A Message from Dr. Daniela Flores



To: Student Chemists
From: Dr. Daniela Flores, Lead Chemist at the Universal Space Agency
Subject: Missing Lake on Titan

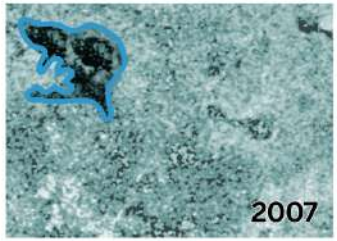
UNIVERSAL SPACE AGENCY

Dear Student Chemists,

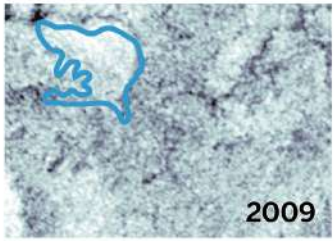
Scientists at the Universal Space Agency are investigating what happened to one of the methane lakes on Titan. The following slides depict the same location at two different times. As you will see, the location looks very different in the two pictures. As student chemists, we ask for your help in determining what happened to this missing lake.

Thanks,
Dr. Flores

What Happened to the Lake?



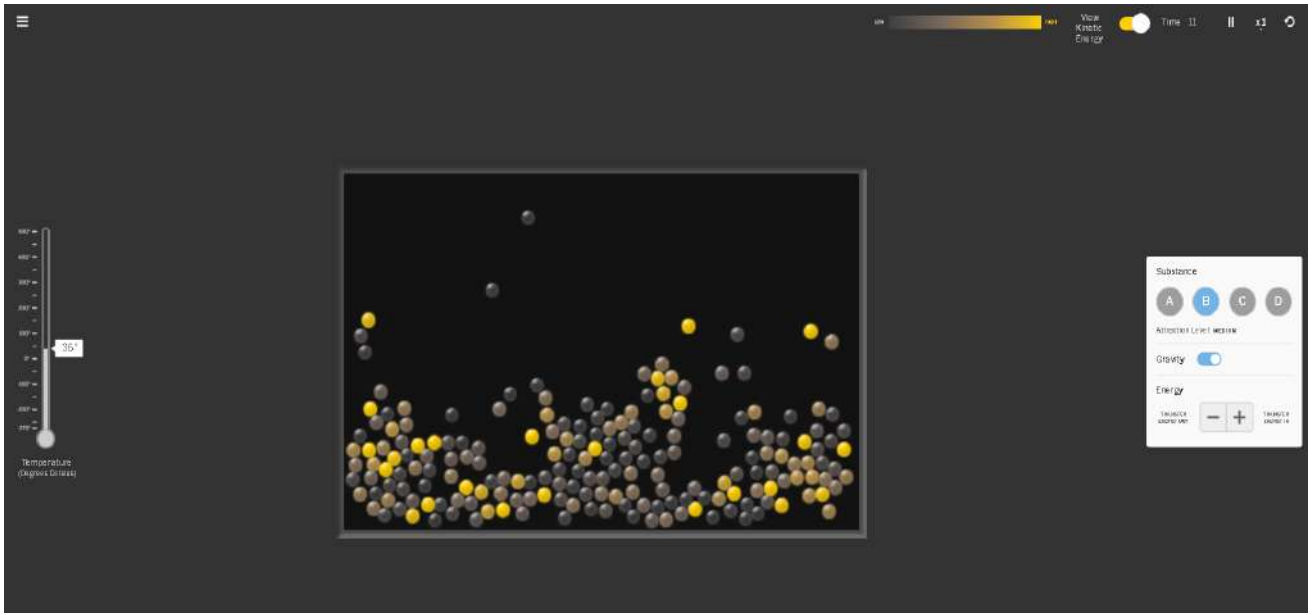
Scientists note a dark area in photos from a NASA probe in 2007. The area outlined in blue is a liquid lake.



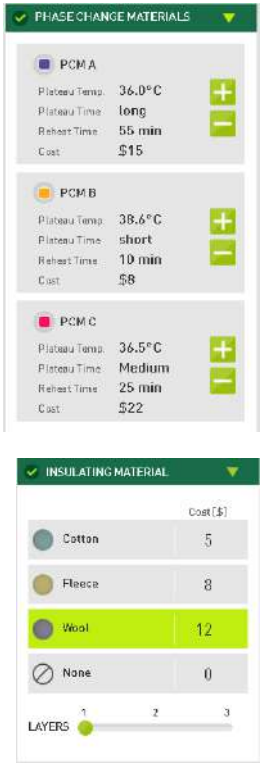
Two years later, the area outlined in blue is now much lighter. What happened to the lake?

Engages Students

- Online Simulations
- Hands on Activities
- Student Choice
- Engineering

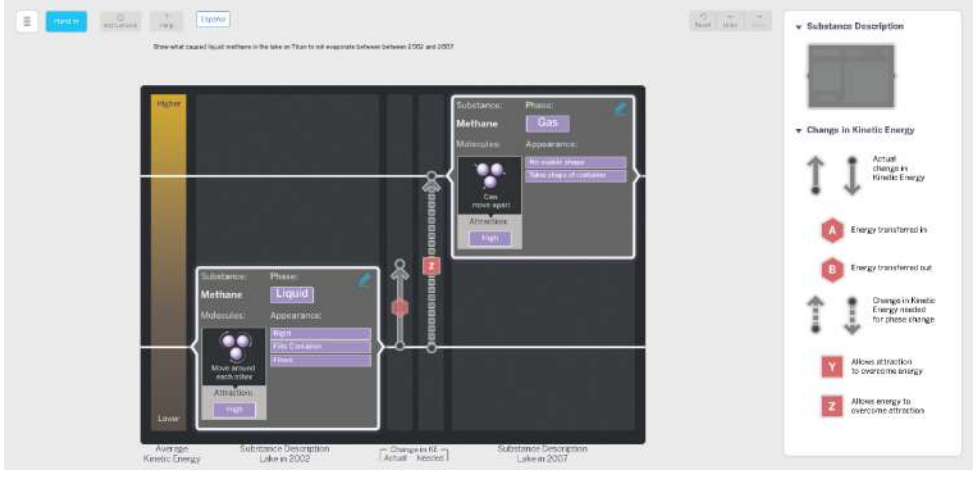


Engages Students Continued



Meets the Needs of All Students

- Multiple Modalities
  - Modeling Tools (Drawing)
  - Simulations
  - Writing CER's
  - Multi-Linguistic
- Flexibility to be Rigourous or Scaffolded



STEMscopes

Home | Planner | Segments | Scopes | Streaming | Coding | Standards | Students | Assessments | Help | jennifernguyen

Feedback

Evidence of Common Ancestry

Bookmark Scope

Topics | Grade High School - The Living Earth | Standards | Curriculum Area Science

Home | Engage | Explore | Explain | Elaborate | Evaluate | Intervention | Acceleration | All

Student Wondering of Phenomena

What similarities can you find in organisms that show they are related?

Performance Expectation

HS-LS4-1

Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Clarification Statement: Emphasis is on a conceptual understanding of the role each line of evidence has relating to common ancestry and biological evolution. Examples of evidence could include similarities in DNA sequences, anatomical structures, and order of appearance of structures in embryological development

Essentials

- Standards Alignment T
- Teacher Background ESP T
- Teacher Background T
- Teacher Scope Presentation T
- Answer Keys T
- Materials List T
- CCC and SEP Scoring Rubric T

Engage

Graphic Organizer

Evidence of Common Ancestry

Name: _____ Date: _____

What similarities can you find in organisms that show they are related?

What are some examples of how fossils form?

Why are homologies used as evidence of common ancestry?

Why is the fossil record used as evidence of common ancestry?

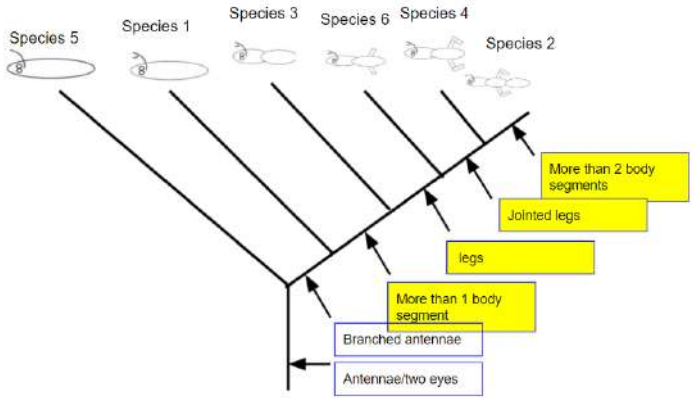
What form or forms of evidence are most prevalent among scientists to construct their theories of common ancestry?

Investigative Phenomena

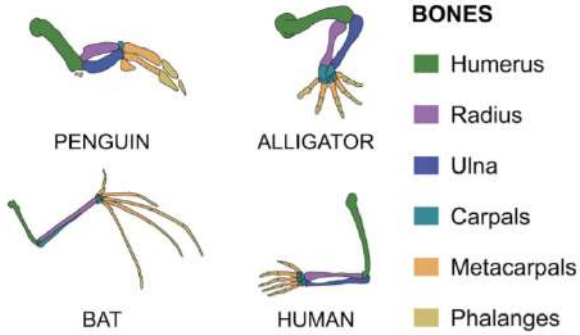
Name: _____ Date: _____

Initial Phenomena Question: What similarities can you find in organisms that show they are related?
Record your answers to the question in the boxes below.

Before Instruction	During Instruction	After Instruction

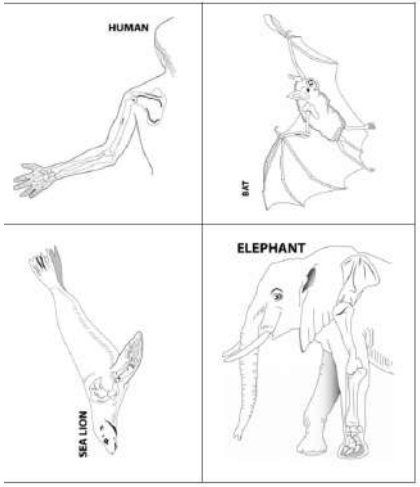


Explore Examples



Station 1

Station 2



Station 2: Anatomical Homologies Questions

1. How is the human forelimb similar to that of the other three mammals you examined? Be specific.
2. Why might this evidence suggest a distant common ancestor between different vertebrate species? Explain your answer.
3. Analyze the forelimbs you colored and labeled. What similarities would you expect to find in the forelimb of another vertebrate species, such as a gecko or ferret? Identify these similarities and explain why these similarities might exist.

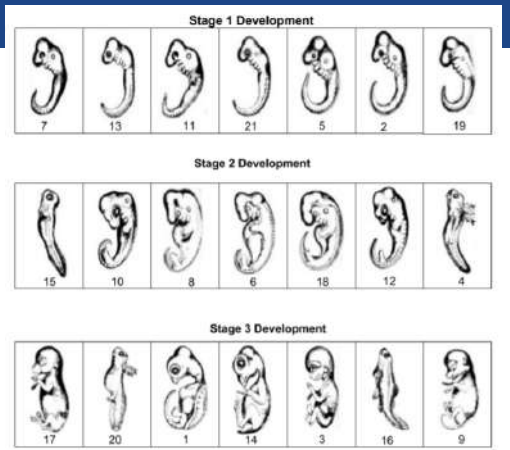
Directions

Read the following passage, and then continue on to complete questions 4 through 6.

As you have just learned, anatomical homologies are similar anatomical structures that exist between species that can be identified as a link to a common ancestor. Similar features suggest relatedness among the organisms. Anatomical homologies are sometimes easy to observe, as is the case with modern Asian and African elephants and the now-extinct woolly mammoth. All three are distinct species, but they belong to the same family of organisms that have large skeletons, trunks, and tusks (Elephantidae).

Mammals are a class of organisms that all share certain traits, such as breathing air, having hair or fur, and producing milk for their young. As you have already seen, all mammals show similar patterns of bone structures in their forelimbs. However, mammals have forelimb structures strikingly similar to that of other types of animals, including birds and reptiles.

4. What is a homologous structure, and what are some examples?
5. Humans are mammals, which are defined as having a certain set of anatomical homologies. What are some homologous structures shared by all mammals?
6. What occurred during the Cambrian explosion? How is this significant in terms of common ancestry?



Stage of Development	Fish	Tortoise	Calf	Human	Chick	Rabbit	Salamander
Stage 1							
Stage 2							
Stage 3							

Station 3: Developmental Homologies Questions

1. What did you notice as you were trying to match the images of each stage of development to the correct animal? Was it difficult? What were some of the challenges in doing so?
2. After you have matched the cards, describe some of the similarities that you found among the embryos of the seven different animals.
3. Explain how the similarities in early embryonic development may point to common ancestry among these animals. Make sure to state what they all have in common.

Read the following passage, and then continue on to complete questions 4 through 6.

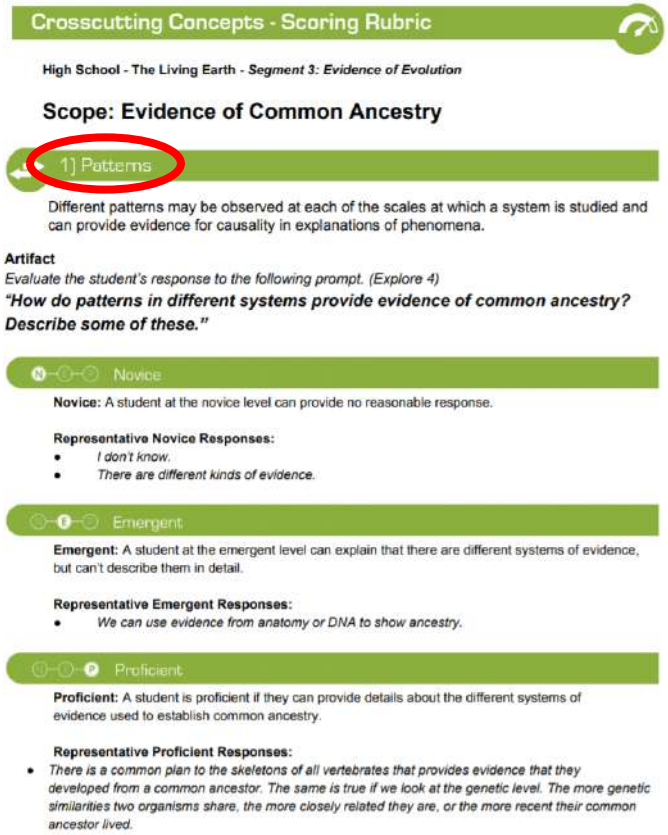
Developmental homologies can be observed by studying similarities in embryos' formation. For this station, you will analyze common features of early chordate development and then evaluate these similarities as evidence of common ancestry. Chordates, from the phylum Chordata, are animals that are mostly vertebrates (this phylum does include some related invertebrates). Humans, whales, fish, and squirrels are all chordates.

All chordates share four anatomical structures that appear during specific embryonic developmental stages. Below is a diagram of a very early embryonic chordate. This illustration shows the different parts that all chordate embryos share at some point in their development. The fact that all chordate embryos share these features at some point is one of the major pieces of evidence that points to the common ancestry of all chordates.

Crosscutting Concepts (CCC) & Science and Engineering Practices (SEP)

Science and Engineering Practice	Disciplinary Core Idea	Crosscutting Concept
Obtaining, Evaluating, and Communicating Information Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). **Engaging in Argument from Evidence** Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. **Planning and Carrying Out Investigations** Plan and conduct an	**LS4.A: Evidence of Common Ancestry and Diversity** **LS4.A.1** Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. **ESS1.C: The History of Planet Earth** **ESS1.C.1** Continental rocks, which can be older than 4 billion years, are	**Patterns** Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. Empirical evidence is needed to identify patterns. **Structure and Function** The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials. ----------

CCC and SEP Emphasis in STEMscopes



Crosscutting Concepts - Scoring Rubric

High School - The Living Earth - *Segment 3: Evidence of Evolution*

Scope: Evidence of Common Ancestry

1] Patterns

Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

Artifact

Evaluate the student's response to the following prompt. (Explore 4)

"How do patterns in different systems provide evidence of common ancestry? Describe some of these."

Novice

Novice: A student at the novice level can provide no reasonable response.

Representative Novice Responses:

- *I don't know.*
- *There are different kinds of evidence.*

Emergent

Emergent: A student at the emergent level can explain that there are different systems of evidence, but can't describe them in detail.

Representative Emergent Responses:

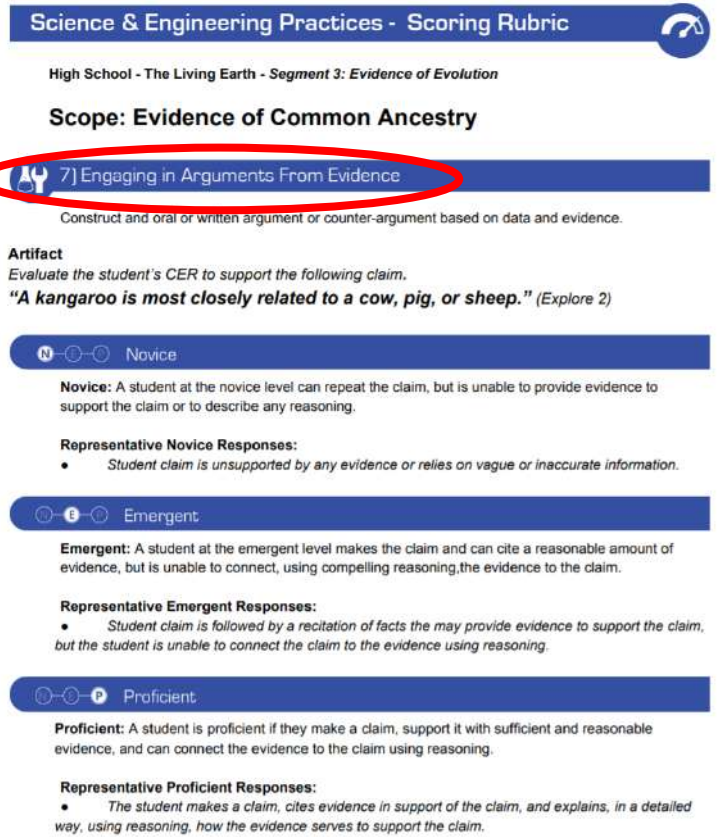
- *We can use evidence from anatomy or DNA to show ancestry.*

Proficient

Proficient: A student is proficient if they can provide details about the different systems of evidence used to establish common ancestry.

Representative Proficient Responses:

- *There is a common plan to the skeletons of all vertebrates that provides evidence that they developed from a common ancestor. The same is true if we look at the genetic level. The more genetic similarities two organisms share, the more closely related they are, or the more recent their common ancestor lived.*



Science & Engineering Practices - Scoring Rubric

High School - The Living Earth - *Segment 3: Evidence of Evolution*

Scope: Evidence of Common Ancestry

7] Engaging in Arguments From Evidence

Construct and oral or written argument or counter-argument based on data and evidence.

Artifact

Evaluate the student's CER to support the following claim.

"A kangaroo is most closely related to a cow, pig, or sheep." *(Explore 2)*

Novice

Novice: A student at the novice level can repeat the claim, but is unable to provide evidence to support the claim or to describe any reasoning.

Representative Novice Responses:

- *Student claim is unsupported by any evidence or relies on vague or inaccurate information.*

Emergent

Emergent: A student at the emergent level makes the claim and can cite a reasonable amount of evidence, but is unable to connect, using compelling reasoning,the evidence to the claim.

Representative Emergent Responses:

- *Student claim is followed by a recitation of facts the may provide evidence to support the claim, but the student is unable to connect the claim to the evidence using reasoning.*

Proficient

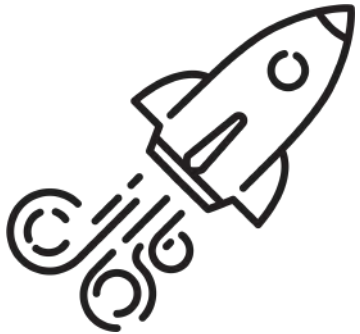
Proficient: A student is proficient if they make a claim, support it with sufficient and reasonable evidence, and can connect the evidence to the claim using reasoning.

Representative Proficient Responses:

- *The student makes a claim, cites evidence in support of the claim, and explains, in a detailed way, using reasoning, how the evidence serves to support the claim.*

Implementation

- All teachers (K-12) will have onboarding training with the publishers on how to use
- The science TOSA will continue to work with teachers creating pacing guides, lessons, and co-teaching with the new curricula
- The science TOSA will work with HS teachers to create common scope and sequences



Questions?