



Science Assessment System Through Course Task

Who Was T. Rex?

Grade Level:

3

Phenomena:

Role of T. Rex in the Ecosystem

Science & Engineering Practices:

Analyzing and Interpreting Data
Engaging in Argument from Evidence

Crosscutting Concepts:

Patterns

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Preparing to implement Through Course Tasks in the Classroom

What is a TCT?

- TCTs are 3-dimensional tasks specifically designed to get evidence of student competency in two dimensions, Science and Engineering Processes (SEPs) and Crosscutting Concepts (CCC), untethered from Performance Expectations (PEs)/standards. Tasks are sense-making experiences.
- Tasks are to be used formatively. The goal is for both students and teachers to understand areas of strength and improvement for the SEP(s) and CCC assessed within the task.

How do I facilitate a Through Course Task (TCT)?

- TCT facilitation is a collaborative process in which teacher teams calibrate understanding of the expectations of the task and refine strategies to be used during task facilitation.

Before the task:

1. Complete the TCT as a learner – compare understanding of task through the lens of success criteria (identified in the task) in order to understand expectations.
Success criteria include:
 - What is this task designed to get evidence of?
 - What is the task asking the students to do?
 - What might a student response look like?
2. Identify the phenomenon within the task. Consult resources to assure teacher teams have a deep understanding of associated science concepts.
3. Collaborate to generate, review and refine feedback questions during facilitation.
4. Identify potential “trouble spots” and plan for possible misconceptions.

During the task:

5. Collect defensible evidence of each student’s competencies in 3-dimensional sense-making for the task.
6. Ask appropriate feedback questions to support student access and engagement with the task in order to elicit accurate evidence of student capacities.

After the task:

7. Reflect on the task as a collaborative team.
8. Review student work samples to identify areas of strength and areas of need.
9. Determine/plan next steps to move 3-D sense making forward through the strengthening of the use of SEPs and CCCs.

Using the materials included in this packet:

- **Task Annotation:**
 - The task annotation is a teacher guide for using the task in the classroom. Additionally, the annotation gives insight into the thinking of developers and the task overall.

- Each task has science and engineering practices, disciplinary core ideas, and crosscutting concepts designated with both color and text style:
 - **Science and Engineering Practices**
 - *Disciplinary Core Ideas*
 - Crosscutting Concepts
- **Student Task:** The materials to be used by students to complete the TCT.

Who Was T. Rex? Task Annotation

After analyzing *characteristics of both predators and scavengers*, **state a claim** as to the *primary role of T Rex within an ecosystem* and **support the claim** using similarities identified within **the data as evidence**.

Overall intent of the task

The overall intent of this task is to elicit evidence of student ability to use data, gathered from analysis of multiple sources, as a means for supporting a claim. Students will analyze and interpret data related to identified T Rex body structures as well as structures of current day animals that are identified as primarily scavengers and predators within ecosystems. Students look for similarities in the functions of these organisms as they pertain to meeting their need for food. Students reason with the data to determine if they believe T Rex is indeed primarily a predator or a scavenger.

Phenomenon within the task

Within an ecosystem, some animals rely on other animals as a food source. Carnivores, those organisms that eat meat, are categorized as primarily predators or primarily scavengers. Animals have structures that match their needs. Although there are distinguishing traits between carnivores (meat eaters) and herbivores (plant eaters), making it easier to tell the difference between these organisms, it is not as easy to distinguish between a predator and a scavenger. Often predators and scavengers have similar body structures, but they use these structures differently. Because our understanding of T Rex's role in an ecosystem is limited to fossil records, some scientists still debate whether T Rex was actually a predator when it roamed the earth.

How the phenomenon relates to DCI

T Rex is often a topic of interest among grade school children. All that we know about this animal comes from fossil records. This task does not focus on DCIs related to animals once living on the earth nor does it focus on fossil records. Rather, this task incorporates multiple DCIs at the K-2 and 3-5 grade bands that primarily emphasize how animal structures function in ways that help them survive.

- Kindergarten - Students learn that animals need food to grow. They explore that food comes from plants and animals (LC1C).

- Grade one - Students gain understanding about how the external structures of animals function in ways to help them survive (LS1A).
- Grade two - Students explore the concept that animals depend on other animals and plants for food (LS2A).

The DCI information in the task provides students with an opportunity to apply prior content knowledge to a novel scenario.

What information/data will students use within this task?

Prior understanding/experiences:

- That organisms have structures that function in a way to help it survive
- Familiarity with T Rex, fossil records
- Analyzing data for similarities and differences
- Reading and completing information charts/tables
- Comparing living organisms (eagle, lion, vulture, hyena) to ancient organisms
- Practice writing claims supported by evidence
- Sorting skills

Information in task:

- T Rex picture and list of characteristics
- Characteristics of known scavengers and predators

Ideas for setting up the task with students

Before facilitating the task, you may want to have kids fill out a KWL chart about Tyrannosaurus Rex to activate prior knowledge. Consider gathering a variety of sources for kids to look at; include old encyclopedias/textbooks, new online sources and some fiction books.

Possible questions to prompt thinking related to the resources:

- Where have you seen/read/learned about the T-Rex?
- Were any of those sources fiction?
- Why does it matter if the information came from fiction or nonfiction source?

- How or why might a fiction story want to change characteristics of the T-Rex?
- Were any of those sources old?
- How did the information change from the older book to a new source?
- Why would this information change?
- So, how do we know what we know about the T-Rex and other dinosaurs?

Also, consider having students watch “[How Do We Know What Dinosaurs Looked Like?](#)” by Brain Stuff - How Stuff Works on YouTube

- Guide students in a discussion to discover how scientists learn about dinosaurs. Pose questions leading students to consider how looking at the structures (body parts of the fossils) and making inferences. For instance, the sharp teeth are useful when eating meat, etc.
- Next, scaffold the first part of the task to provide all students an equal opportunity to access the information.

Page 1: Read together and encourage students to infer how one of those structures helped the organism survive. Allow students time to share out their ideas. Did anyone interpret the structures differently? (This could be a good place to end if you are going to do this over multiple days).

Page 2: Go over all the evidence statements together to make sure that all students understand that some were similar but not exactly the same. Individually, have students cut and sort the statements, and then compare with a partner to make any corrections needed before they glue them to the paper (Page 3 or another sheet of paper). This provides an opportunity for group discourse. Promote conversations that stimulate curiosity and productive talk about which pieces of information provide the strongest evidence for both claims. (This could be a good place to end if you are going to do this over multiple days).

Page 4: Students discuss any similarities they see between the lion and eagle (predators). Why are these structures similar? Would these structures help with hunting? How? Discuss any similarities they see between the vulture and the hyena. Why are these structures similar? Would these structures help with scavenging? How? Encourage students to highlight or mark the most important structures that each animal uses to find its food.

Page 5: Have students complete the chart using the data from page 4. Have a class discussion about possible answers for the T-Rex portion of the chart, but encourage a variety of thought. Students might interpret the function of the structures differently. The goal is not to identify the “correct” interpretation but to stimulate thinking about evidence that would support any interpretation. Students should be aware that scientists still debate this issue. (This could be a good place to end if you are going to do this over multiple days). Whether completion of this component of the task is collaborative or independent is dependent on student ability and teacher expertise. Either way, consider sharing out findings through class discussion.

Page 6: After reading the directions aloud, students should complete this part of the task independently. Emphasis should be on the evidence used to support the claim.

Intent of the Task for Assessment

This task was designed to determine if students are able to support a claim (T Rex was a predator or a scavenger) with appropriate evidence. Students sort evidence to match different claims about how the T Rex obtained food to survive. They then look for similarities between the information provide on T Rex and that of present day scavengers and predators that would support their claim. There is not one right answer. Rather, a student could make either claim. The strength of their use of supporting evidence is the primary focus of the task.

Students evaluate how current living organisms use their structures as either predators or scavengers and how the T Rex’s structures are alike or different from the current organisms, and then make a claim. Students analyze the provided information then use this information to support one of two claims about the role T Rex had in an ecosystem (ecosystem is not emphasized).

Although the graphic organizers and charts are wonderful tools to formatively assess student thinking, they are primarily used to scaffold and support students as they prepare for the final task. It is here that teachers will be able to gather evidence related to student ability to successfully use synthesized data as evidence to support a claim. Teachers will need to determine the extent of scaffolding provided based on the needs and ability level of their students. Never should you simply hand the task to the students to complete without a plan for facilitation that encourages authentic engagement and provides all students with an entry point to the task content.

Success Criteria

Evidence of Learning Desired based on Progression from Appendices

Analyzing and Interpreting Data

- Analyze and interpret data to make sense of a phenomenon, using logical reasoning.

Engaging in Argument from Evidence

- Construct and/or support an argument with evidence, data, and/or a model.

Patterns

- Identify similarities and differences in order to sort, classify and communicate natural objects and designed products.

Success Criteria

Student claims that T Rex was either a predator or scavenger and supports the claim with synthesized structure/function information about current living predators and scavengers that they transfer to T-Rex based on structural similarities.

Possible Student Responses

Evidence for predator:

I know that the T-Rex was a predator because it used its sharp teeth and claws to tear meat like the lion and eagle. The T-Rex also had forward facing eyes to look for prey like the lion. I know he is not a scavenger because his little arms would not help him tear apart carrion the way a hyena does.

Evidence for scavenger:

I know the T-Rex is a scavenger because it had a large olfactory sensory part of its brain to smell rotting meat. His strong sense of smell was similar to the hyena and vulture that savage today. The T-Rex used his sharp teeth to tear the meat and bones of dead animals. Scientist have found bone in T-Rex fossilized poop and hyenas eat the bones. The T-Rex also had no feathers on his head, just like the vulture, to prevent disease from eating rotten meat.

Evidence if they mark both:

This can be a combination of the evidence listed above. Animals alive today will mostly be hunters or scavenger but will do both to survive, so I know that the T-Rex did both as well.

Other information teacher teams might find useful when preparing to use this task in the TCT process

This task was used after the 3rd grade unit on inheritance and variation of traits but before engaging with the interdependent relationships unit. Students had experience with the concept of traits and how they help organisms survive. In addition, students were excited for the next unit that looked at fossils.

Extensions and/or other uses after the task is implemented

- Articles for teacher background knowledge about this argument:

Know that most scientists support the idea that the tyrannosaurus was a hunter, but that does not have to be the answer your students come up with in this task to be successful! A couple of articles which support this idea include:

- Was Tyrannosaurus rex a predator or a scavenger? BY TRACY V. WILSON of How Things Work
<https://science.howstuffworks.com/environmental/earth/geology/t-rex-predator-or-scavenger.htm>
- It's Official: T. Rex Was Ferocious Predator, Not Scavenger by Tia Ghose of Live Science
<https://www.livescience.com/38182-tyrannosaur-tooth-in-hadrosaur-tail.html> This article has a great clip in the middle that you may want to show students, where they talk about new evidence that makes some think it must be a hunter. There is a quote from one scientist about it being only one data point, the least amount of data you can have.
- Videos to share with students:
 - “Was Tyrannosaurus a Scavenger or Predator?” by World Book Network. This video presents the evidence for both sides and reasons them out. <https://www.youtube.com/watch?v=4AHDaYRqDBI>
 - “T-Rex: Predator or Scavenger?” BBC Video (on YouTube) with evidence of T-Rex as predator:
<https://www.youtube.com/watch?v=BVCirEyuXNE>
- Books to share with students:
 - T. Rex: Hunter or Scavenger? (Jurassic World) (Step into Reading) by Dr. Thomas R. Holtz Jr., Random House
 - Why Do Scientist Disagree? (Seeds of Science Roots of Reading) By Gina Cervetti, Delta Education
 - This book focuses on how scientists will interpret data to have different meanings and uses Galileo as an example.
 - The Dinosaurs of Waterhouse Hawkins by Barbara Kerley, Scholastic Press
 - This book shares the story of the first man to imagine what dinosaurs looked like and how he compared fossils to the bones of organisms alive today.

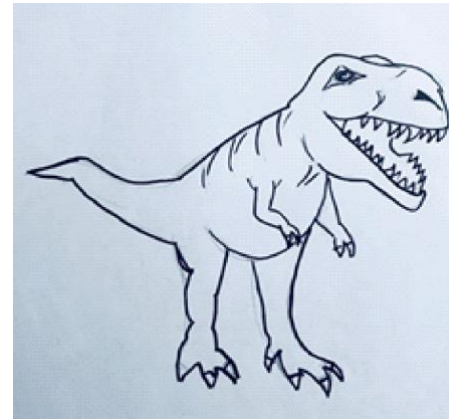
- My students were also very interested in the fact that the T-Rex had feathers, so I found this video on YouTube to share with them that shows what we now think the T-Rex looked like based on fossilized evidence.
 - “What did the T-Rex Look Like?” by Dangerville <https://www.youtube.com/watch?v=G2-Wa-loX3Y>

Through Course Task – Who Was T. Rex?

Charlie loves getting books about dinosaurs at the library. Today he found the following graphic in a book about the Tyrannosaurus Rex (T Rex). He looked closely at the structures (body parts) of the T Rex listed in the graphic.

List of T Rex body structures

- Sharp teeth
- Short arms
- Big legs
- Large nostrils (nose)
- Large olfactory (smell) sensors in the brain
(part of brain that processes smell)
- Small eyes that face forward
- Sharp claws
- Most likely only had feathers on its back



Charlie knew that an animal's structures function in a way that help it survive. He considered the basic needs of all animals and wondered how each of the structures listed above helped T Rex survive.

- A. Choose one of the structures of the T Rex's body. Explain how the function (special job) of that body part helped the T Rex survive.

Charlie was very surprised when one of his books stated that some scientists claim T Rex might have been a **scavenger**. A scavenger is an animal that eats animals that have already died (called carrion) to survive. He found this alarming because all of the books and movies Charlie had seen about the T Rex claim it was a **predator**, an animal that hunts other animals to get the food it needs to survive.

Charlie did some further research. Below is the evidence he found to support each of these two claims.

Cut out the pieces of evidence below and sort them on the correct side of the t-chart on the next page.

Short arms - would not have helped catch or fight prey.	Strong legs - ran up to 30 miles per hour	Large nostrils and <i>olfactory sensors</i> (part of the brain that processes smell) - strong sense of smell to hunt
Sharp teeth - ate the meat and bones of carrion (dead animals).	Sharp teeth - for cutting meat	Small, weak eyes - most hunters have excellent eyesight
Forward facing eyes - to stalk/hunt prey	Heavy legs - it would have fallen if it ran and scientists have not found footprints of a T Rex running.	Large nostrils and olfactory (smell) sensors (part of the brain that processes smell) - smelling rotten carrion.
Feathers only on back - prevent illness (bacteria won't stick to its head).	Short arms - many birds such as eagles are able to hunt without arms	

T Rex is a PREDATOR because...	T Rex was a SCAVENGER because...

Circle the piece of evidence that you think is strongest for each claim.

Charlie was still puzzled about T Rex. He decided to research the characteristics of predators and scavengers that are alive today to compare to those of T Rex. One interesting fact he found is that although animals have a primary way to get food, most will do what is necessary to survive. The following chart provides information on present day scavengers and predators that Charlie researched.

Animals that survive by hunting and/or scavenging

Eagle	Lion	Vulture	Striped Hyena
<ul style="list-style-type: none"> ● Best eyesight in the animal kingdom ● Eyes are large compared to its body size ● Poor sense of smell ● Sharp talons (claws) for catching prey ● Sharp beak for tearing meat ● Feathers on head ● Strong wings that help it fly great distances to look for prey (animals to eat) 	<ul style="list-style-type: none"> ● Great eyesight (rely mostly on this sense when hunting) ● Forward facing eyes ● Strong paws for fighting ● Soft paw pads for silently hunting/stalking prey ● Good sense of smell ● 30 strong, sharp teeth ● Not fast runners, only pounce short distances 	<ul style="list-style-type: none"> ● Strong sense of smell ● Good eyesight - face forward ● Long toes with weak talons that are good for walking ● Do not use feet in feeding ● Hooked beaks for tearing carrion (dead meat) ● No feathers on their heads to prevent illness ● Fly extremely high in the sky 	<ul style="list-style-type: none"> ● Teeth strong enough to eat meat and bones ● Long front legs and strong neck to pull apart meat ● Can smell carrion from a distance ● Excellent eyesight to watch for vultures - eyes face forward ● Strong sense of hearing to listen for other predators ● Slow trot in zig-zag patterns

Charlie created the following chart to help him record the function of body structures of these animals. He plans to compare this information with the information he previously gathered on T Rex.

Complete the Charlie's chart below by adding notes about how each animal uses certain structures to help it get the food it needs to survive.

Function of structures	Sight	Sense of smell	Ability to move	Grasp food
Eagle-Predator				
Lion-Predator				
Vulture-Scavenger				
Hyena-Scavenger				
T-Rex-?				

Charlie thought about the similarities between the animals' structures and how each one functions in ways that help the animals obtain food for survival. Based on his analysis of all the information, Charlie felt he had evidence to support a claim about T Rex. How about you?

The information analyzed throughout this task can be used to explain why you think T Rex was either primarily a scavenger or primarily a predator. Think about all of the similarities and differences between the function of the similar body structures. Use data from the chart as evidence to support T Rex as being primarily a predator or primarily a scavenger.

T Rex was primarily a _____.

What evidence leads you to state this claim and why? Your answer should go beyond restating the information found in the chart.
