

Dinosaurs: How Do We Know What We Know?

Lesson Plan

Grade Level: 3-5

Curriculum Focus: Fossils

Lesson Duration: 1-2 class periods

Student Objectives

- Discover how scientists form theories about what dinosaurs were like
- Use clues to try to determine what a dinosaur looked like and how it behaved.
- Understand that scientists may draw different conclusions from the same evidence.

Materials

- Discovery School video on *unitedstreaming: Investigating Dinosaurs*
Search for this video by using the video title (or a portion of it) as the keyword.

Selected clips that support this lesson plan:

- Land Dinosaurs: Predator or Prey
- chart paper
- markers

Procedures

1. Explain to students that they are going to learn about how scientists use evidence left by the dinosaurs to tell what dinosaurs looked like and how they behaved. Let students know that they will be trying to decide some things about dinosaurs from what dinosaurs left behind.
2. Ask the members of the class to raise their hands if they have ever seen a re-creation of a dinosaur in a movie or on television. Ask them to name some movies in which they have seen these things. You can also ask them to name some places where they have seen or could see dinosaur skeletons or models.
3. Next, ask the members of the class to raise their hands if they have ever seen a real live dinosaur – not a dinosaur in a movie or in a museum. Ask them if anyone in the world has ever seen a living dinosaur. Ask them what remains of dinosaurs that lived millions of years ago.
4. Explain to students that dinosaurs lived so long ago that no human being has ever seen a real one, which means that the best we can do is have theories about what they looked like and how they behaved. Tell them that scientists who study dinosaurs are called paleontologists (write this word on the chalkboard) and that some theories that paleontologists have had about

dinosaurs have been proven wrong. For example, in the movie Jurassic Park, giant sauropods (plant eaters) are seen standing on their hind legs to eat leaves off of tall trees, but many scientists do not believe that sauropods ever did that!

5. Remind students that skeletons are the only remains we actually have of dinosaurs. Ask them to look at pictures of dinosaurs or dinosaur skeletons to determine what an artist would have imagine.
6. Explain to students that scientists use clues to develop theories about dinosaurs. Tell them about fossils (write this word on the board as well), and explain that fossils include dinosaur bones, dinosaur footprints, dinosaur teeth, and even dinosaur eggs.
7. Explain that paleontologists can use footprints to learn about what dinosaurs looked like and how they behaved. Provide illustrations or photographs of dinosaurs that had different kinds of feet. Ask your students to choose partners and work together to write a sentence about what each set of footprints reveals about each dinosaur. What might the footprint say about the dinosaur's physical features or behaviors? Then have partners write a second sentence about how the two dinosaurs are different from each other. Make sure that students explain what characteristics of each footprint led them to their conclusions. These Web sites include dinosaur footprint pictures:
 - www.enchantedlearning.com/subjects/dinosaurs/dinotemplates/Footprint.shtml
 - www.stone.uk.com/dinos/
8. Bring the class together again and ask students to share what they have written. Guide students to provide evidence to support their theories about what each dinosaur might have looked like. (For example, why do you think the dinosaur was a fast runner?) Explain that scientists must always rely on evidence when making important conclusions.
9. Have students research a particular dinosaur or fossil find. Students should compare the conclusions made by different scientists. Because physical evidence is scarce, scientists may not agree on a dinosaur's appearance or behavior.

Discussion Questions

1. What parts of a dinosaur's body would be useful for defense from a predator?
2. How do scientists know which dinosaurs were predators and which were prey? What evidence do they have?
3. What evidence would scientists use to figure out whether a dinosaur moved slowly or quickly?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students participated actively in class discussions; provided clear and thoughtful conclusions about the dinosaur footprints; supported their conclusions with strong evidence.



- 2 points: Students participated in class discussions; provided satisfactory conclusions about the dinosaur footprints; supported their conclusions with some evidence.
- 1 point: Students did not participate in class discussions; provided vague conclusions about the dinosaur footprints; did not support their conclusions with any evidence

Vocabulary

adaptation

Definition: Adjustment to environmental conditions; modification of an organism or its parts that makes it more fit for existence under the conditions of its environment.

Context: Over millions of years, some dinosaurs' bodies experienced adaptations that helped them survive.

fossil

Definition: A remnant, impression, or trace of an organism of past geologic ages that has been preserved in the Earth's crust.

Context: When they went to the museum, Jane and Bill saw dinosaur fossils that had been dug up and brought there from Arizona.

ichthyosaur

Definition: Any of an order of extinct marine reptiles of the Mesozoic specialized for aquatic life by a streamlined body with a long snout, limbs reduced to small fins for steering, and a large lunate caudal fin.

Context: The ichthyosaurs of the Mesozoic lived almost entirely in the ocean, even though they breathed air.

predator

Definition: One that preys, destroys, or devours; an animal that lives by predation.

Context: Scientists think that Allosaurus was a predator who killed and ate other smaller dinosaurs.

prey

Definition: An animal taken by a predator as food.

Context: Although it was quick, Camptosaurus often became the prey of other larger dinosaurs and was eaten by them.

pterosaur

Definition: Any of an order of extinct flying reptiles existing from the Late Triassic throughout the Jurassic and most of the Cretaceous and having a featherless wing membrane extending from the side of the body along the arm to the end of the greatly elongated fourth digit.

Context: Launching itself from the face of the cliff, the pterosaur swooped down over the water in search of fish to catch and eat.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Diversity and adaptation of organisms
- Earth Science: Earth's History
- Science as Inquiry: Abilities necessary to do scientific inquiry

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science—Life Science: Understands the basic concept of evolution of a species.
 - Science—Science and Technology: Understands the nature of scientific inquiry.
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>