THE MYSTERY FOSSIL: TEACHER GUIDE

Subject: Life Science
Grade Level: Middle School
Last Updated: October 27, 2008

Case Summary

Mr. Williams takes his class on a scavenger hunt for plants and animals that live in different areas of the school. The students are surprised to make a unique discovery which sparks their attention and lead them down different roads to what is being learning in class. What did they find? How does it apply to what they are learning?

Credits

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Learning Objectives

Upon completing the case students will be able to:

1. Explain how physical characteristics of organisms have changed over successive generations (e.g. Darwin's finches and peppered moths of Manchester).
2. Compare and contrast how modern humans physically different from their ancestors.
3. Describe what kinds of mutations can be passed from parent to offspring.
4. Describe ways in which species on earth have evolved due to natural selection.
5. Explain how natural selection applies to the theory of evolution.
6. Explain example of selective breeding.
7. Trace evidence that the fossil record in sedimentary rock provides evidence for the long history of changing life forms.
8. Describe the process of fossil formation.
9. Stimulate the process of forming a fossil.

Georgia Performance Standards

S7CS1. Students will explore of the importance of curiosity, honest, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works. (NSES Content Standard A)

S7L5. Students will examine the evolution of living organisms through inherited characteristics that promote survival of organisms and the survival of successive generations of their offsprings. (NSES Content Standard C)

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Assessment

At the end of each scene, students will turn in their box chart, which will be graded based on clarity and completeness. Students stay on task because they are responsible for turning in their box chart. The case is graded on their combine grades of box chart and products. A 5-point scale will determine their grade (5=excellent, 4=very good, 3=good, 2=fair, and 1=poor) that will be converted into a percentage depending on the wait of the assignment. For each criteria:

- Accuracy and depth of product component; attention to grammar and mechanics
- Individual/contribution within the team
- Individual research ability and effort – online, print, investigative questions.

See the rubric form below for the box chart.

The last two criteria (participation and individual effort) will be judged not only by the facilitator, but also by the students to be completed at the end of the case. See the Self/Group Evaluation form in ***Student Materials***.

At the end of the case, students are to create a poster that hypothesizes about the evolution of 3 animals that exist today. The work should show the factors that will drive the evolution of specific characteristics of the animal. The poster can be assigned as group work or as individual assignments.

Not included in these materials: Students completed two labs found in the textbook, Mystery Footprint and Survival of the Chocolate.

Holt Science & Technology: Life Science. (2001) Holt, Rinehart, & Winston: Austin, Texas

Implementation Strategy

This case is designed to take place over five 120-minutes class sessions. It has two scenes. This case can be facilitated by one or two facilitators. The students will be responsible for their own learning by brainstorming ideas within their group and then with the whole class.

Students will read, discuss and write notes on their box charts in small groups and then discuss facts, questions, hypotheses and learning issues in a whole group. During the small group discussion, the facilitator/teacher monitors each group by checking for understanding and helping students with any problems that may arise. During the whole group discussion, the teacher/one of the facilitators write down notes on a overhead projector, white board or smart board. The teacher may want to assign students to record as well. With this method, students learn to work together in their team as well as in a whole group, sharing their information and possible competing against other teams.

Implementation Schedule:

Day 1 (120-mins.)

- Overview of Evolution (5 mins.)

- Read scene 1 (10 mins.); complete box charts (20 mins.); share and discuss as a whole class (30 minutes);
- Divide up learning issues among group (10 mins.)
- Computer Lab: Research learning issues (45 mins.)

Homework: Finish researching learning issues.

Day 2 (60-mins.)
- Share and discuss learning issues research with small group (20 mins.) and then with whole group (40 mins).

Here our students completed a lab from the textbook: Mystery Footprint: Students will analyze and form a hypothesis to investigate on several human footprints. Students will compare and contrast their footprint to the mystery footprint. Students completed a lab report. (60 mins.)

Homework: Finish researching any remaining learning issues.

Day 3 (120-mins.)
- Discuss new learning issues from homework research (10 mins.)
- Complete scene 1 evaluation; wrap up (5 mins.)
- Read scene 2 (10 mins.); complete box charts (20 mins.); share and discuss as a whole class (20 minutes).
- Divide the learning issues among the group (10 mins.)
- Computer Lab: Research learning issues (45 mins.)

Homework: Finish researching learning issues

Day 4 (120-mins.)
- Share and discuss learning issues researched with small group (20 mins.) and then with whole group. Use textbook to research any additional issues (40 mins.).
- View a clip on Dawin's Dangerous Idea PBS Video (5 mins.)

Here our students completed a lab from the textbook: Survival of the Chocolate: Students will apply the idea of natural selection to a population of candy-coated chocolates. In the "species" of candy, students will study that shell strength is an adaptive advantage. Plan an experiment to find out which color of candy had an advantage over other colors in terms of shell (candy coating) strength. Students completed a lab report. (60 mins.)

Homework: Review Scene 2 and box chart

Day 5
- Complete scene 2 evaluation; wrap up (5 mins).
- Work on poster assignments

Homework: Study Scene 1 and 2 box chart research findings

Facilitator Guide:

Sample student Box Chart

Facts	Pre-Hypothesis
Scene 1 Mr. Williams found a mysterious rock. Living things have changed over time. Students found a footprint. Scene 2 Dr. Brown attended the same school as the students.	Scene 1 If the rock has a fossil on it then the fossil is over a million years old. Scene 2 Species change because the environment changes. The two similar birds are from the same island. Both birds DNA were mutated.
Learning Issues	**Action Task**
Scene 1 What is a species? What is an organism? What is evolution? What cause species to change? What are vestigial structures? How old is a fossil? Scene 2 What is the Theory of Evolution? What is selective breeding?	Library Science textbook Science books in classroom Internet website Newspaper Guest speakers (scientists)

Resources

Holt Science & Technology: Life Science. (2001) Holt, Rinehart, & Winston: Austin, Texas

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