*Reflection:*

 *This artifact demonstrates my understanding of this Earth Science concept (mold fossil formation) and provides an example of how I would integrate the inquiry process into my science lesson plans.*

 *This task required me to familiarize myself with the NYS Science Standards. It also challenged me to think about how I can integrate multiple subject area curricula into a single lesson plan. In this instance, I intentionally included writing and art standards into this science lesson to get the biggest bang for my buck. I now find myself routinely thinking how I can augment my lesson plans by integrating other subject area curricula.*

###### Childhood/Early Childhood Department

###### Lesson Plan

**Date of Lesson \_\_\_\_11/1/089\_\_\_\_\_ Time \_\_\_\_\_\_\_\_\_\_\_\_\_ Length of lesson\_\_2 hrs 5 min\_**

**Curriculum Area** \_Science\_ **Content Area:** Earth Science

**Title of Lesson (identify concepts taught) \_\_Sedimentary Rock and Mold Fossil Formatio\_\_**

**Age/Grade level\_\_2nd grade\_\_\_\_ Teacher’s Name \_\_Mike Cecere\_\_\_\_\_\_\_\_**

**1. Learning Objectives** (What the student must do or demonstrate [action verbs])

At the end of this lesson students will be able to:

a) Describe how sedimentary rock is formed

 b) Explain how shell mold fossils are formed in layers of sedimentary rock over time.

 c) Infer what kind of living thing became the mold fossil they observed.

 d) Make models of trace fossils and compare to real fossils.

 e) Describe local areas where Devonian shale might be found (gorges, creek beds, shale

 outcrops, etc)

**2. New York State Learning Standards (Science, Math Art, Language arts, etc…as needed)**

 Standard 4 The Physical Setting

 Key idea 2: Many of the phenomena that we observe on Earth involve interactions

among components of air, water, and land.

 General Art

 Texture: Artists use texture to add detail and interest to works of art – both two

dimensional and three dimensional.

 ELA Standard 3 Language for Critical Analysis and Evaluation

 Speaking and writing: Speaking and writing for critical analysis and evaluation

requires presenting opinions and judgments on experiences, ideas, information and issues clearly, logically, and persuasively with reference to specific criteria on which the opinion or judgment is based.

**3. Materials** (for the lesson)

\* 10 pieces of local Devonian shale with shell mold fossils in them

\* 10 magnifying glasses

\* A five-gallon fish tank

\* Miscellaneous sediments

\* Several pieces of sedimentary rock

\* 3 gallons of water

\* Several small shells

\* Map of our local region (specifically the southern end of Cayuga Lake)

\* Several digital photos of local Devonian shale

\* Digital projector

\* Whiteboard in the classroom

**\*\*** Art materials necessary to make models of trace fossils. This part of the lesson will be led by the art teacher who I am collaborating with.

**4. Lesson Process**

1. **Engage / Introduction** (approximate time) / Links to prior knowledge ***(10 minutes)***

(Teacher does this)

 Questions, Read, KWL, “T” Chart, Think-Pair-Share, etc…… (State what you will use)

I will use a KWL chart to learn what background knowledge the students have regarding rock and fossil formation. Potential questions include:

 How are rocks formed?

 Have you ever seen a trace fossil in a rock?

 If so, what was it a fossil of and how was it formed in the rock

I will facilitate a discussion to understand what they want to learn about rock and fossil formation. Potential questions include:

 What do you want to learn about the formation of rocks?

 Are you curious to know how fossils become embedded in rock?

1. **Explore / Learning procedures relating to objectives *(15 minutes)***

 (Students do this) **This cannot be a worksheet!**

*Hands-on*

*or*

*Minds-on*

I will pair students up and give each pair a piece of local shale and a magnifying glass. I will then give each pair the following tasks:

1. Spend 5 minutes inspecting the rock and documenting everything you observe using your 5 senses.
2. Write down your explanation of how the rock and the mold fossil(s) were formed (what series of events happened to create what you are seeing?). Also, infer what kind of living thing became the mold fossil you observed.
3. Share your explanation with your partner.

List all links to other curriculum areas; be sure you have included the standards.

writing, critical thinking, speech development, active listening, positive community

behavior (sharing)

**(C) Explain /** **Conclusion (**approximate time)/Checking for understanding ***(20 minutes)***

(Student to student, student to teacher & teacher to student)

Explain the science behind this lesson; ***this is where* you teach new material and the new vocabulary is introduced**

1. Have two to three students quickly share their initial explanations
2. Introduce the word “sedimentary” and ask the students if they know what “sediment” is.
3. Provide a definition of sediment and show them examples of different types of sediment:

Sediment – bits of rocks, shells, and the remains of plants and animals (ScienceSaurus, (2005), p. 164)

 and then explain that one type of rock is “sedimentary rock.” Pass around several examples of sedimentary rock with some displaying obvious layering.

1. Bring out the fish tank that already has a layer of sediment under some water and describe the series of events that could take place to create sedimentary rock from the sediment in the tank. This includes additional sediment deposition via a creek or stream and squeezing and cementing that has to act upon buried sediments to create sedimentary rock.
2. Introduce the fact that this specific type of sedimentary rock is Devonian shale and was named for the geologic era when it was formed. Also mention that all of the rocks in the classroom were found locally here in Ithaca.
3. Now that students have an understanding of how sedimentary rock is formed, ask them to take a minute and re-explain to their partners how the mold fossils were formed in their rock.
4. Ask a couple of students to share their updated explanations.
5. Provide a demonstration by laying several small shells on top of the layer of sediment then covering those shells with an additional layer of sediment. Explain how sediment might naturally be deposited to cover shells in this example. Explain how sediment is carried from the local creeks into Cayuga Lake (use a map of the area to explain basic watershed principles).

**(D)**  **Extend, Expand, or Elaborate /** “**If time”/ extensions *(10 minutes, 75 minutes)***

 (Students do this)

*In classroom extension:*

Have each pair of students quickly brainstorm where they think rocks like the one they were given might be found locally. Ask them to describe in writing the type of area/environment that would have this type of shale.

After having several student pairs share where they think Devonian shale can be found locally, show 3-4 photos of different local areas where shale exists. Refer back to the local map and point out all of the gorges found along the southern shore of Lake Cayuga.

*Art class extension:*

Have the art teacher spend a class (at most two) teaching the students how to make models of trace fossils. Plan to use small shells similar to the ones found in the local shale. Upon completion, invite the art teacher to the next science lesson and have students compare and document the differences between the model and real fossils.

**(E)** **Evaluation / Assessment**

(Teacher does this)

(a) Learning outcomes of previous lessons related to this topic:

 N/A

(b) Focus of assessment in this lesson (related to and restates the objectives)

 Will be on students’ ability to:

1. describe how sedimentary rock is formed
2. explain how shell mold fossils are formed in layers of sedimentary rock
3. infer what living thing became the mold fossil they observed
4. predict local areas where Devonian shale could be found

(c) Method of **assessments** used in this lesson (example attached)

 Alternate style assessment:

 Students will create and illustrate a story about how an abandoned shell

became a shell mold fossil found within a layer of sedimentary rock (see

attached instructions).

(d) Differentiation (of expected **outcomes**)

*Differentiation of activity is to be provided and described throughout the lesson plan to ensure that children’s individual learning needs are met.* ***You must describe how this will be done. You may do this in chart form.***

 (i) Low level students

 See attached charts.

 (ii) Higher level students

 “

 (e) Lesson modifications

(i) Low level students

 (ii) Higher level students

**5. Assessments of lesson** (Attach examples)

See attached assessment.

**6. Student work** Attach any worksheets used during / after the lesson.

**7. Learning center** Provide the directions and materials

**8.** **References** (Resources / sources used in creating lesson plan) **[**If you use Science is… or the Sciencesaurus you must include the page number(s)]

ScienceSaurus: a student handbook. (2005). Wilmington, MA: Great Source Education Group.

NYS ELA Standards. http://www.emsc.nysed.gov/ciai/ela/elastandards/elamap.html

NYS Elementary Science Core Curriculum (Grades K-4). <http://www.emsc.nysed.gov/ciai/mst/pub/elecoresci.pdf>

Union-Endicott CSD Curriculum Map Worksheet. <http://www.uetigers.stier.org/maps/artmusic/art/levelb/Texture.pdf>

***Writing Workshop Assignment***

Now that we’ve completed the science lesson on sedimentary rock and mold fossil formation, I’d like you to write and illustrate a story about how an abandoned shell became a shell mold fossil within a layer of sedimentary rock.

Please include answers to the following questions in your story:

1. Where did the shell originally come from?
2. How did the sedimentary rock form?
3. What happened to the shell that left the mold fossil in the rock?
4. Where might we find sedimentary rock in Ithaca?

*Be creative and have fun!*