

**iDigFossils: Engaging K-12 Students in Integrated STEM via**

**3D Digitization, Printing and Exploration of Fossils**

**Project-Based Learning Lesson Plan**

**Name of the Lesson Developer**

**Lesson Title**

e.g., How Big Was Megalodon?

**Grade Level**

e.g., 6th – 7th grade

**Time Frame**

e.g., two 45-minute class periods

**Driving Question**

e.g., How big was megalodon?

A good question is *feasible*, *worthwhile*, *contextualized*, *meaningful*, and *ethical* (Krajcik & Czerniak, 2013). The driving question captures the heart of the project by providing purpose using clear and compelling language. Driving questions (also called compelling questions) pose simply stated real world dilemmas. They pose predicaments that students find interesting and actually want to answer. What is a compelling question for a teacher may not be a compelling question for a student!

**Learning Goals**

Think of learning goals as the consequence or product of the 3 dimensions associated with the performance expectation(s) of your lesson.

To identify the 3 dimensions on your performance expectation, we recommend you use the NSTA platform:

<http://ngss.nsta.org/AccessStandardsByDCI.aspx>

**Anchoring Event**

Describe how you plan to trigger students’ interest in the question and problem (e.g. invite a scientist to situate the problem, show a PBS video clip explaining its causes and effects etc.).

**Collaborations**

Describe the types of collaborative work that will occur during the project. Simple placement of students in groups does not ensure effective collaboration. How will you facilitate effective collaboration within and across teams and possibly even classrooms?

**STEM Integration**

Describe the science, math, engineering, and technology knowledge and skills this activity helps develop.

**Assessment**

What artifacts will students develop during the project and how will these projects be assessed. To be effective, artifacts need to address the driving question and demonstrate student understanding of the learning goals by reflecting the learning performances you identified above. If you plan to use a rubric, please paste it here.

Buck Institute’s PBL Rubrics: <http://bie.org/objects/cat/rubrics>

How will your assessment incorporate student understanding of the 3 dimensions of learning - disciplinary core ideas, crosscutting concepts, and scientific/engineering practices?

a) Formative assessments:

b) Summative assessment(s):

**Procedure**

Explain the specific sequence of activities that will scaffold student learning. A good frameworks for developing procedures is the 5E model (<http://bscs.org/bscs-5e-instructional-model>). Does the procedure meet the following criteria: <http://bie.org/object/document/pbl_essential_elements_checklist>

**NGSS Standards**

List relevant NGSS standards for the intended grade level.  
<http://www.nextgenscience.org/search-standards>

|  |  |
| --- | --- |
| **Insert your performance expectation here:** | |
| **Science Practices** | **Connection to the Lesson** |
| Find it here:  <http://ngss.nsta.org/AccessStandardsByDCI.aspx> |  |
| **Disciplinary Core Ideas** | **Connection to the Lesson** |
| Find it here:  <http://ngss.nsta.org/AccessStandardsByDCI.aspx> |  |
| **Crosscutting Concepts** | **Connection to the Lesson** |
| Find it here:  <http://ngss.nsta.org/AccessStandardsByDCI.aspx> |  |

**CCSS Standards**

List relevant CCSS state standards for the intended grade level for math and/or language arts.

<http://www.corestandards.org/Math/>

<http://www.corestandards.org/ELA-Literacy/>

**Other Standards**   
(optional – examples are ISTE standards, 21st century skills and 4C’s etc.)

<http://www.iste.org/standards/iste-standards>

<http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf>

<http://www.p21.org/component/content/section/9>

**Resources & Materials**

List the resources and materials that teachers may find useful when they implement this project-based lesson. Common examples are YouTube videos, TED Talks, simulation tools, research briefs etc.

**Key Academic and/or Scientific Language**

List the terms used in the lesson and definitions (e.g., deep time, brachiopod etc.).

Some of the many paleontology glossaries:

<http://palaeos.com/paleontology/glossary.html>

<http://www.fossilmall.com/Science/Glossary.htm>

**Prerequisite Knowledge**

Explain what knowledge and skills students should have developed before engaging in this project-based lesson.