**Alex Lazarony – Lesson Plan**

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| **Lesson Planning Guide** |
| **Develop Lesson Plans for Instruction** |
| Steps in developing [NGSS](https://www.nextgenscience.org/)-/standards-aligned, phenomenon-based lessons that are guided by the [5Es instructional model](https://bscs.org/bscs-5e-instructional-model):   1. Complete the Lesson Plan Overview (Part A) to guide development of lesson plans. 2. Use the Lesson Plan Template (Part B) to create detailed lesson plans. |

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| https://lh4.googleusercontent.com/3nF12fEN5h5hgtv4ZofuvibTcwtHVJ_NWtFhMVgHDmo2KU1R-JQY3ndc2Eo8Bc9pXdnqo8Erfx-JMqcT-KaHxMnFOfqsxBUKLF28abqNdDstymCGzJ6SlLhYSu-KzuetFn1Mts6_yLg | **Lesson Overview Template (Part A)** | | |
| **1.a Select grade level NGSS** [**Performance Expectations**](https://www.nextgenscience.org/search-standards?keys=&type%5B%5D=performance_expectation) **(PEs) or** [**Topics**](https://ngss.nsta.org/AccessStandardsByTopic.aspx)**, or district/state standards that support lesson-based student learning goals.**  For NGSS, PE color coding reflects its 3-dimensional learning components. Search the [Evidence Statements](https://www.nextgenscience.org/evidence-statements) for details on what students should know and do. | | | |
| |  |  | | --- | --- | | *MS-ESS2-2.* | *Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.* | | | | |
| **1.b Identify a lesson-based** [**anchoring phenomenon**](https://static1.squarespace.com/static/56ef1da37da24f301fccaacd/t/5aa86e09652dea04982ceb94/1520987659683/NGSS+StorylineTool%231-AnchoringPhenomenon+-+v2.2.pdf) **that builds towards understanding of the PEs/standards, and is engaging and relevant to students.**  See more about [phenomena](https://www.ngssphenomena.com/) and using [phenomena with NGSS](https://static1.squarespace.com/static/56ef1da37da24f301fccaacd/t/581f4bb3e58c62bd0983dd03/1478446005130/Using+Phenomena+in+NGSS.pdf). | | | |
| Anchoring phenomenon should be looked at near the beginning of the unit, or at least prior to today’s lesson.  The teacher should put out (or show pictures of) different types of sand. This will lead students to ask many questions, such as: Why are the sands different colors? Why are the grains different sizes? Why are the grains different shapes? This could be a leading phenomenon for an entire unit/subtopic on erosion and weathering. The five pictures from activity can be used, or addition sand pictures can be shown from Science of Sand website. <https://www.scienceofsand.info/sand/sandintro.htm> | | | |
| **1.c Ask a Driving Question, which is authentic and student-focused, that relates to investigating the PEs/standards and phenomenon.**  See more about [Driving Questions](http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=53) and using [Driving Questions with NGSS](http://nstacommunities.org/blog/2013/08/01/essential-questions/). | | | |
| How does rounding and sorting of sand help you tell how much it has been eroded? | | | |
| **1.d Unpack the** [**3-D learning components**](https://www.nextgenscience.org/three-dimensions) **of the Performance Expectations/standards in the table below.**  For NGSS guidance, see the [NGSS Topic Arrangements](https://ngss.nsta.org/AccessStandardsByTopic.aspx) and [NGSS DCI Arrangements](https://ngss.nsta.org/AccessStandardsByDCI.aspx). Use tools to [unpack](https://ngss.nsta.org/ngss-tools.aspx) each PE separately. | | | |
| [**Science and Engineering Practices**](https://www.nextgenscience.org/sites/default/files/resource/files/Appendix%20F%20%20Science%20and%20Engineering%20Practices%20in%20the%20NGSS%20-%20FINAL%20060513.pdf) **(SEP)**  **(skills)** | | [**Disciplinary Core Ideas**](https://www.nextgenscience.org/sites/default/files/resource/files/AppendixE-ProgressionswithinNGSS-061617.pdf) **(DCI)**  **(content)** | [**Crosscutting Concepts**](https://www.nextgenscience.org/sites/default/files/resource/files/Appendix%20G%20-%20Crosscutting%20Concepts%20FINAL%20edited%204.10.13.pdf) **(CCC)**  **(connections)** |
| **Constructing Explanations and Designing Solutions**  Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS1-4),(MS-ESS2-2) | | **ESS2.A: Earth’s Materials and Systems**  The planet’s systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth’s history and will determine its future. (MS-ESS2-2)  **ESS2.C: The Roles of Water in Earth's Surface Processes**  Water’s movements—both on the land and underground—cause weathering and erosion, which change the land’s surface features and create underground formations. (MS-ESS2-2) | Scale Proportion and Quantity Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-4),(MS-ESS2-2) |
| 1.e Determine students’ prior knowledge about the lesson concepts. (e.g., pre-test, class discussion, exit ticket, 1-minute report, KWL chart, survey, etc.) | | | |
| Students should be familiar with the idea that the more rounded a sand grain, the more erosion it has undergone – This should be assessed in a previous lesson before starting today’s lesson. Teacher will ask the whole class, before the activity, thought provoking questions to resurface prior knowledge. For example, “What happens to a rock’s shape the more it is eroded?” | | | |
| **1.f Identify Lesson Topics and Learning Goals:** List main lesson concepts related to grade level PEs/standards that support student learning goals in figuring out the anchoring phenomenon; revise as needed. | | | |
| Topics: erosion, rounding and sorting of sand grains  Student Learning Goals: The student will observe the rounding and sorting of sand samples to determine the relative amount of erosion that has occurred. | | | |
| **1.g Select Lesson Resources:** Identify resources to develop lessons that address the PEs/standards and investigate the anchoring phenomenon through a variety of sequenced activities; revise as needed (include title and URL). | | | |
| Photos of sand for anchoring phenomenon and worksheet: Science of Sand, <https://www.scienceofsand.info/sand/sandintro.htm> | | | |

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|  | **Lesson Plan Template (Part B)** | | | | | |
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| **Grade and Subject** | Grade 8 – Earth & Space Science | | | | **Instructional Time**  (min.) | 40 minutes |
| **Lesson Title (Topic)** | Erosion | | | | | |
| **Anchoring Phenomenon**  (copy from 1.b) | Anchoring phenomenon should be looked at near the beginning of the unit, or at least prior to today’s lesson.  The teacher should put out (or show pictures of) different types of sand. This will lead students to ask many questions, such as: Why are the sands different colors? Why are the grains different sizes? Why are the grains different shapes? This could be a leading phenomenon for an entire unit/subtopic on erosion and weathering. The five pictures from activity can be used, or addition sand pictures can be shown from Science of Sand website. <https://www.scienceofsand.info/sand/sandintro.htm> | | | | | |
| **Driving Question**  (copy from 1.c) | How does rounding and sorting of sand help you tell how much it has been eroded? | | | | | |
| **Lesson Overview** | | | | | | |
| **Lesson Summary**  (description) | | | **Lesson Topics and Student Learning Goals**  (copy from 1.f) | | | |
| **1.** Teacher will ask guided questions to prompt students’ prior knowledge about erosion.  **2.** Activity Worksheet  *Part 1:* The student will first observe the five pictures of the five different sands. The sands are from Conesus, New York; Plattsburgh, New York; Devon, England; Ha Long Bay, Vietnam; and Maui, Hawaii. The student will take note as to how much rounding is present and how well each sample is sorted. The student should use the sorting chart as guidance for sorting and rounding analysis. Additional instruction may be needed for use of sorting chart if students have not been exposed to it or something similar before. After students have made their observations for each sample, they will order the samples from most erosion to least erosion. This process will require prerequisite knowledge that the more rounded and well sorted, generally the more erosion has occurred.  *Part 2*: Students will use their own collected sand sample from home, or will use a prepared sand sample from the teacher. The student will take the sand sample and observe it with a hand lens. The student will sketch grains from their sand sample, focusing on the details of grain shape and sorting, similar to what they did in Part 1, only they are creating the image. After they have sketched an image of their sand sample, they will once again use the sorting chart to determine how well sorted and rounded their sample is. The last piece of the activity is for the student to place their sand sample in order with the four other samples, placing it where it fits in terms of how much it has been eroded.  3. Closure 🡪 Students and teacher will discuss the last question on the worksheet (How does rounding and sorting of sand help you tell how much it has been eroded?). The activity worksheet should be collected as a formative assessment. | | | Topics: weathering and erosion, rounding and sorting of sand grains  Student Learning Goals: The student will observe the rounding and sorting of sand samples to determine the relative amount of erosion that has occurred. | | | |
| **Lesson Resources Aligned with Standards** | | | | | | |
| **Lesson Resource**  (copy from 1.g, sequenced with titles and links) | | | **Resource Standards Alignment**  (copy from 1.d, standards notated, link optional) | | | |
| Photos of sand for anchoring phenomenon and worksheet: Science of Sand <https://www.scienceofsand.info/sand/sandintro.htm> | | | **ESS2.C: The Roles of Water in Earth's Surface Processes**  Water’s movements—both on the land and underground—cause weathering and erosion, which change the land’s surface features and create underground formations. (MS-ESS2-2) | | | |
| **Teacher Preparation** | | | | | | |
| **Student Misconceptions**  (potential student ideas that are problematic when engaging in the lesson) | | | **Scientific Terminology**  (vocabulary named once students “figure out” concepts of lesson) | | | |
| N/A for this lesson. This lesson is supplemental to their previous knowledge. | | | Erosion  Sand Grain | | | |
| **Materials Preparation** | | | | | | |
| **Student Needs**  (activity sheets, data packet, etc.) | | **Group Needs**  (lab equipment, group data packets, etc.) | | **Safety & Technology Needs**  (unsafe materials, websites cued, etc.) | | |
| Activity worksheet (attached)  Sorting chart (attached)  Sand sample from home (optional) | | Hand lenses  Local sand samples | | N/A | | |
| **Supporting Information** | | | | | | |
| **References**  (links to cite sources of data, images, websites, etc.) | | | **Background Reading**  (for teachers and/or students) | | | |
| <https://www.scienceofsand.info/sand/sandintro.htm> | | | N/A | | | |