Periodic Odyssey – Lesson Plan

Lesson Overview

Title: Periodic Odyssey

Investigate responsible production and consumption of the earth's resources.

Learn how rare some materials are and the impact of their greater use is on the world.

In this lesson, learners review how materials and elements are obtained to produce items we rely on for everyday functions. Learners will recognize how the production and consumption of certain materials impacts Earth.

Student Ages:

11-13

Subjects:

Science, Technology, Climate, and Environment

Skills:

Character, Citizenship, Critical Thinking

Estimated Completion Time:

Two to three days of 45-60 minute class periods.

Multiplayer or Single player focus:

Single

Level of Minecraft Experience necessary for educators to run lesson:

Beginner

Lesson Plan

Learning Objectives

Learners will…

1. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
    a. NGSS MS-PS1-3
2. Develop models to describe the atomic composition of simple molecules and extended structures.
    a. NGSS MS-PS1-1
3. Understand that cause and effect relationships may be used to predict phenomena in natural or designed systems.
    a. NGSS MS-PS1-4

Essential Questions

- How do we create the material things all around us?
- What are these items made of?
- How does the acquiring of materials impact others and the whole world we live in?

Teacher Preparation & Notes

1. Explore content within the library of element books in the Minecraft: Education Edition World.
2. Read over ahead of time:
    a. Where Do Metals Come From? | Wonderopolis.
        - NGSS.PS1.A, NGSS.PS1.B, CCRA.R.4, CCRA.L.3, CCRA.L.6, CCRA.R.1, CCRA.R.2, CCRA.SL.1, CCRA.R.10, CCRA.W.2, CCRA.L.1, CCRA.L.2
3. Click though the Dig into Mining: Metals In Your Everyday Life activity to be familiar with the different elements and what items they can be found in.
4. Watch World's Largest Lesson Animation: Part 1 | The World's Largest Lesson (globalgoals.org) and Generation Earthshot | The World's Largest Lesson (globalgoals.org) to understand how globally important valuing sustainability is.

a. Copy and add the Flipgrid discovery topics to a Flipgrid group you create.
    - What is Sustainable Development – World's Largest Lesson | Educator Dashboard (flipgrid.com).
    - Imagine If… – World's Largest Lesson | Educator Dashboard (flipgrid.com).
5. Link to your learning management system (LMS) or class workspace and share content with learners: Welcome - Discovery Freeport II (digintomining.com) for learners to access on Day 1.
6. Print ahead of time, or have digitally available, the linked PDF for learners to complete. Handbook.pdf (digintomining.com)
7. Link to your LMS or class workspace and share content with learners:
    a. Day one:
        - Shortage of raw materials semiconductor enterprises ushered in a fierce reshuffle SMM | Shanghai Non ferrous Metals.
    b. Day two:
        - 17 rare-earth elements are essential to modern technology.
        - Semiconductors: The humble mineral that transformed the world (bbc.com).

Student Activities

Day One:

Estimated time: 60 minutes

1. As a class, share what kinds of mineral learners can identify from items they see around the classroom. This may be done verbally or as a brainstorm using a tool such as Whiteboard or Padlet.
    a. What kinds of minerals do the learners interact with outside of school?
        i. On the bus?
        ii. In a car?
        iii. Along a sidewalk and in activities after school?
2. Introduce and share the linked Wonderopolis article. Learners start by reading and exploring Where Do Metals Come From? | Wonderopolis. Consider pairing students who need reading support or use a tool like Immersive Reader to increase comprehension.
    a. Watch as a whole class or encourage learners to view independently the linked videos from the Wonderopolis article.

3. After completing the article, learners should navigate and explore the Dig into Mining: Metals In Your Everyday Life resource.
    a. Have learners count the number of metals they interact with. Have learners share while comparing different experiences and interactions with everyday items.
4. Discuss as a class to understand each learners knowledge base on how minerals are obtained.
    a. Ask leading questions about the process to find and obtain minerals.
    b. What happens to the mine and land after mining has ceased?
    c. How does this process impact the environment and ecosystem around the area being mined?
5. Have learners independently explore and complete the virtual *Aim to Reclaim* virtual lab: Welcome - Discovery Freeport II (digintomining.com).
    a. Print ahead of time, or have digitally available, the linked PDF for learners to complete: Handbook.pdf (digintomining.com).
6. As learners finish the *Aim to Reclaim* activity, have the article Shortage of raw materials semiconductor enterprises ushered in a fierce reshuffle SMM | Shanghai Non ferrous Metals accessible with a guiding focus to acknowledge that not all elements and minerals are abundant on earth. Explain that the use of these minerals in technology has a great impact on their availability due to demand.
7. Now, share and show the whole class World's Largest Lesson Animation: Part 1 | The World's Largest Lesson (globalgoals.org) and Generation Earthshot | The World's Largest Lesson (globalgoals.org).
8. Give learners a choice to respond to one or both Flipgrid Discovery Library Topics by World's Largest Lesson with how they can make an impact and what their vision is.
    a. What is Sustainable Development – World's Largest Lesson | Educator Dashboard (flipgrid.com).
    b. Imagine If… – World's Largest Lesson | Educator Dashboard (flipgrid.com).

Day two:

Estimated time: 60 minutes

1. Reflect on the previous article discussing the scarcity of raw materials that are needed within items learners use and how they may experience this demand differently.
    a. Automobiles
    b. Smartphones

    c. Computers
    d. Home appliances as they become more digitized.
2. What are the elements that are essential in modern technology?
    a. Read and reference how the 17 rare-earth elements are essential to modern technology. This article is likely difficult for most learners in this age cohort. Help them navigate the article using non-fiction text features to identify the important details needed for this task. These are a list of the elements and basic information on how they are used (first paragraph).
3. With all these individual materials, how does it all come together?
    a. Read how semiconductors are built - Semiconductors: The humble mineral that transformed the world (bbc.com).
4. Have learners access the Minecraft: Education Edition World with a Book & Quill and Camera in their inventory.
    a. Have learners take pictures with the camera and add photos and labels identifying the elements to a Book & Quill within Minecraft: Education Edition connecting the elements found in objects of everyday items around. Encourage students to find and identify the 17 rare-earth elements that are valued in semiconductors for computer chip manufacturing.

Student work example:

Assessment

1. Formative assessments:
    a. [What is Sustainable Development – World's Largest Lesson | Educator Dashboard (flipgrid.com).]
    b. [Imagine If… – World's Largest Lesson | Educator Dashboard (flipgrid.com).]
2. Summative assessments:
    a. Learners take pictures and add identification to a Book & Quill within Minecraft: Education Edition connecting the elements found in objects of everyday items.
        - Identification of the 17 rare-earth elements that are valued in semiconductors for computer chip manufacturing.

    Scoring rubric:

    Meeting standard – Learner correctly identifies all 17 elements from the Minecraft world and associates these items with everyday objects in the real world. learner includes information about each element in the book.

    Below standard – Student misses some elements or does not associate everyday objects in the real world. Elements are missing some information.

External references

- World's Largest Lesson Animation: Part 1 | The World's Largest Lesson (globalgoals.org) (video)
- Generation Earthshot | The World's Largest Lesson (globalgoals.org) (video)
- Where Do Metals Come From? | Wonderopolis (article)
- Dig Into Mining: Metals In Your Everyday Life (activity)
- Welcome - Discovery Freeport II (digintomining.com) (activity)
    - Handbook.pdf (digintomining.com) (activity)
- Shortage of raw materials semiconductor enterprises ushered in a fierce reshuffle_SMM | Shanghai Non ferrous Metals (article)
- 17 rare-earth elements are essential to modern technology (article)
- Semiconductors: The humble mineral that transformed the world (bbc.com) (article)
- What is Sustainable Development – World's Largest Lesson | Educator Dashboard (flipgrid.com) (formative assessment)
- Imagine If… – World's Largest Lesson | Educator Dashboard (flipgrid.com) (formative assessment)