2.1 WHAT DO YOU KNOW ABOUT ENERGY AND RESOURCES?

Lesson Summary

Students will be able to share what they know about energy and natural resources. They will show some of their knowledge through discussions with a partner, and other ideas by writing on sticky notes and/or drawing. This lesson is a pre-assessment to provide teachers with information about student background knowledge as they implement the unit.

(Approx. total time: 25 minutes)

Standards

NGSS Disciplinary Core Ideas

ESS3.A: Natural Resources

All materials, energy, and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not.

PS3.A: Definitions of Energy

Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

NGSS Crosscutting Concepts

Energy and Matter

Objectives

By the end of the lesson, students will

Be able to do (skills/behaviors/scientific and engineering practices):

- Share ideas about energy and natural resources.

Vocabulary

- natural resource: something that is found in nature and can be used by people
2.1 WHAT DO YOU KNOW ABOUT ENERGY AND RESOURCES?

Materials

- Teacher Materials:
  - Curriculum Topic Study (for your reference)
  - Chart paper
  - Chalk board or whiteboard
  - Markers
  - https://www.youtube.com/watch?v=8LfD_EKze2M&spfreload=10
- Student Materials:
  - Sticky notes
  - My Ideas About Energy and Natural Resources handout (if you decide to use the written version of the formative assessment)

Instructional Strategies

Link to Prior Knowledge (20 minutes)

Teacher’s choice: Choose to conduct the formative assessment either individually on paper with a follow-up class discussion, or as a whole group with chart paper or on the whiteboard. Either way, you want to save their thoughts to refer back to later so that they can reflect on their learning at the end of the unit.

This lesson is a chance for you to hear from your students what they know about the topics we are getting ready to discuss. Jot down some notes at the end of the lesson, or take photos to show what they are thinking. Keep their prior ideas and conceptions in mind as you teach the upcoming lessons.

Here is some background on student conceptions from the CTS document that may be helpful to keep in mind as you elicit their ideas:

- Conceptions of Energy: Students entering the fourth grade will generally have a difficult time understanding the concept of energy. Elementary students’ developmental interactions with energy lead to certain patterns of understanding, which are universal across cultures (Nordine et al., 2016). Several models describe how students think about energy initially (Nordine et al., 2016; Watts, 1983). Students may follow a human-centered model, where they associate energy with how much energy they have, and assume that energy is linked solely to humans. This is problematic for explaining how heat energy interacts with ice, for example, because students may believe that energy is associated only with living things (Nordine et al., 2016). Other common student conceptions include grouping objects based on whether they “need” and “have” energy and associations between energy and a bright “display” (Nordine, et al., 2016, p. 19). However, energy is not as simple as a source and user; a chair stores chemical energy, but does not give it in the same way that an outlet does. Energy release does not have to be visually striking. For example, sound waves transmit energy yet are invisible. Some students may believe that energy is temporary and disappears after use, contradicting conservation of energy. Others may believe that energy is restricted to device use, rather than for all life and objects (Driver, Squires, Rushworth & Wood-Robinson, 2015).
2.1 WHAT DO YOU KNOW ABOUT ENERGY AND RESOURCES?

Sources of Energy: Some students may think that ‘energy’ is synonymous with fuel - that fuel is energy rather than fuel ‘contains’ or ‘is a source of’ energy (Driver et al., 2015). This stems from students using their intuition and previous experiences to understand the world around them, but energy is not intuitive. Teachers should aim to build off of students’ intuitive beliefs and current understandings through targeted instruction (Nordine et al., 2016). Some students might use the words “producing energy” when they are talking about producing electricity at a power plant. Energy changes form at a power plant, but isn’t created or produced. The energy already exists in the source (coal, wind, etc.).

Tell students about the unit they’re beginning and the pre-assessment task.

This week we will begin a science unit on energy and natural resources. Today I want to know what you’ve already learned about these topics. Don’t worry about whether you are right or wrong, I just want to know what you are thinking.

Hand out 2.1S and review directions OR lead discussion described below to elicit prior knowledge.

At this point in the lesson, either follow along below and have students share their ideas/discuss/write on sticky notes, or ask students to complete the formative assessment independently after you read the questions.

What other words come to mind when you hear the word energy? Turn and talk to a partner about what you think about when you hear the word energy.

Pick 2 or 3 words that you thought of and put them on a sticky note (or write on the whiteboard).

Take a look at the list and choose a few that are either apparent and obvious (seem solid connections) or seem surprising and ask students to explain why they picked that word. The goal here is to elicit conceptions that are likely accurate (e.g. the word motion or light as a connection to energy) and other preconceptions that need further unpacking (e.g. the word frog). You can review their prior knowledge about energy by looking at key words. Many students may only associate energy with motion or with living organisms. Their sticky notes (or words on their formative assessment) will give you an idea about their prior experiences with energy.

**Note: Now is not the time to address or change student ideas. You will have time to teach these concepts later in more depth. Use this as a chance to probe their thinking, so that you can understand their conceptions and prior experiences learning about these topics.

Another thing we’ll learn about in this unit is natural resources. What is a natural resource?

Share this definition if needed: Natural resources are things that are found in nature and can be used by people.
2.1 WHAT DO YOU KNOW ABOUT ENERGY AND RESOURCES?

Can you think of some examples? Let’s make a list on the board (or chart paper).

Students may list things like water, wildlife, rocks, soil, etc. They often learn about these in earlier grades.

Which natural resources give us energy? Explain how they give us energy.

If students need more scaffolding: We use natural resources to make electricity at power plants. Do you know what resources we use? Do we use any natural resources for heat in our stoves or grills?

Students might suggest that plants give us food for energy, or that we eat fish/other wildlife for food. Students may know that we get energy from coal, or the sun, or even electricity from water. You are just asking this to get a sense for whether students know that we get our electricity from fossil fuels, wind, the sun, etc.

Closing (5 minutes)

Give students a preview of the upcoming unit.

Today you shared some things you already know about energy and natural resources. It’s great that you know so much. I am also excited that there are some unanswered questions that we can find answers to together.

If you have technology available, this video is a nice introduction to our unit on energy and resources. Tell students to watch and be ready to tell you which resources are needed to bake a cake.

- https://www.youtube.com/watch?v=8LfD_EKze2M&spfreload=10

If video or technology are not available, just tell students that tomorrow we will begin to explore energy in some objects that they use every day (e.g. lights and radios).

References


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**Planning Page**

Students will be able to share what they know about energy and natural resources.

**Link to Prior Knowledge (20 minutes)**

Tell students about the unit they’re beginning, and the pre-assessment task.

Hand out 2.1S and review directions, OR lead discussion described below to elicit prior knowledge.

**Closing (5 minutes)**

Give students a preview of the upcoming unit.
MY IDEAS ABOUT ENERGY AND NATURAL RESOURCES

Name: ______________________________________________________________

Date: _____________________________

Teacher: ____________________________________________________________

1) **Draw or write a few words you think of when you hear the word energy.**
2) Make a list of any natural resources that you’ve learned about.

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3) Which natural resources give us energy? Explain how they give us energy.

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