

Coal Mining

Lesson Plan for Grade 4, Class EDUC 3613

Time to complete lesson 15-20 minutes

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Original activity/plan from: Original

PURPOSE Statement: (Basic idea students should get from this lesson)

Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning fossil fuels.

NGSS Standards

Dimension 1--Scientific and Engineering Practices

Obtain and combine information from books and other reliable media to explain phenomena.

Dimension 2--Crosscutting Concepts

Cause and effect relationships are routinely identified, tested, and used to explain change.

Dimension 3--Disciplinary Core Ideas

Energy and fuels that humans are used to derived from natural resources, and their use affects the environment in multiple ways.

Some resources are renewable over time, and others are not.




OKLAHOMA STANDARD:

4.ESS3.1 Obtain and combine information to describe that energy and fuels are derived from renewable and non-renewable resources and how their uses affect the environment.

Measurable Learning OBJECTIVE (aligns with the assessment used)

The student will discover how energy and fuels derived from non-renewable resources affect the environment by utilizing a chocolate chip cooking and a toothpick at a 70% mastery, utilizing a rubric scores produced by the student's reflective journal entry.

MATERIALS NEEDED:

1. Paper plates
2. Chocolate chip cookies
3. Toothpicks
4. Composition notebooks
5.  Lesson Plan B Reflective Journal Rubric
6.  Lesson Plan B Reflective Journal Graphic Organizer
7.  Lesson Plan B Verbal Reflective Journal Checklist

Motivational Hook (Engage from the 5-E's)

1. The teacher will activate prior knowledge of non-renewable resources. For instance, what are some examples of non-renewable resources? Can they be replenished once they are used?
2. The teacher will read *The Coal Thief* by Alane Adams. This book gives students a glimpse of how a non-renewable resource, such as coal, is used to produce energy.

Inquiry-based Questions--(what can you ask to inspire curiosity?)

1. Why is coal a non-renewable resource?
2. Do you think extracting coal affects Earth's surface?
3. What will happen when we use all of the coal?

Mini Lesson/Explicit Teaching (Engage, Explore, and Explain from 5-E's):

1. The teacher will define a non-renewable resource: a resource that cannot be replaced after it is used.
2. The teacher will explain that coal is a nonrenewable resource. The teacher will discuss how non-renewable resources are widely used to produce energy and fuels, but extracting the resources affects the environment.

Guided Practice (Explore from 5-E's):

The teacher will then explain the learning activity: using a chocolate chip cookie to simulate coal mining. The learning activity will simulate how coal mining affects Earth's surface. The teacher will give step by step instructions for the learning activity.

1. Each student will receive a chocolate chip cookie and a toothpick.
2. The teacher will set a timer for 5 minutes. During the 5 minutes, students must carefully extract the chocolate chips from the cookie, making as little damage to the cookie as possible.
3. After the 5 minutes have passed, students will compare their mining experience to the other students'.
4. The teacher will facilitate a whole group discussion about how their mining experience relates to coal mining on Earth's surface.

Once students completed the activity, the teacher will ask the students to share if their coal mining was successful. The teacher will then connect the teaching instruction to learning activity. For example, just like removing the chocolate chips affects the cookie, so does coal when extracted from Earth's surface.

Independent Practice (Explore from 5-E's):

After the learning activity, students will respond to the following prompt in their composition notebooks:

In at least six sentences, please reflect on what you learned from the learning activity.

1. What is a nonrenewable resource? Please provide an example.
2. What was the learning activity? What did the students do? What did the simulation represent?
3. What were your predictions before the experiment?

4. Were your predictions correct?
5. Were you able to extract the chocolate chips successfully and without damaging the cookie? Please explain.
6. How does coal mining affect Earth's surface? Please explain.

Formal or informal Assessment (part of Explain, Elaborate, & Evaluate from 5-E's):

The teacher will complete an informal formative assessment by observing students during guided practice. Through the teacher's observations, she will see which students are not participating, which students are struggling, and which students are performing the experiment successfully. The teacher will also complete a formal formative assessment by utilizing the [Lesson Plan B Reflective Journal Rubric](#) to score the students' reflective journal entries. The teacher will also utilize the [Lesson Plan B Verbal Reflective Journal Checklist](#) for English Language learners' verbal journal entries. Based on the rubric scores, the teacher will utilize the data to gauge the next learning period, such as reteaching the lesson or moving forward to another lesson.

CLOSURE/Summary

To wrap up the lesson, the teacher will facilitate a whole group discussion and recap the learning activity and instruction. The students will also have the opportunity to share their thoughts about the lesson, including their successes and struggles. Closing questions may include:

1. What are two new ideas that you learned from this lesson?
2. Were there any parts of this lesson that were confusing?
3. What was one success that you had in this lesson?
4. What was one struggle that you had in this lesson?

Differentiated Learning/Culturally Responsive Learning Possibilities:

For English Language Learners, students will construct their reflective journals verbally, reporting to the teacher what they have learned from the experiment. The teacher will

utilize the [Lesson Plan B Verbal Reflective Journal Checklist](#) to keep track of the students' verbal journal entries. English Language Learners can also utilize Google Translate on their Chromebooks to help them read or spell words that they may not know. For students with ADHD, students will be provided with the [Lesson Plan B Reflective Journal Graphic Organizer](#) to place in their composition journals to help keep them organized and stay on task.

Classroom Management Plan

The teacher will enforce classroom management in this lesson with the following steps:

1. First, to keep students' focused, the teacher will strategically divide the class into small groups for the learning activity, separating students who may cause disruptions to ensure that students are working in groups that will allow them to work effectively.
2. Once students are divided into groups, the teacher will explain the experiment. The teacher will wait to hand out supplies until after instruction to avoid distractions.
3. After the teacher explains the experiment, she will hand out materials one at a time to each group, explaining the purpose of the material. For instance, the teacher will first hand out the paper plates, which will be used to put their cookie on as they are performing the experiment.
4. Next, the teacher will pass out the toothpicks, which the students will use to extract the chocolate chips from the cookie.
5. Then, the teacher will hand each student a chocolate chip cookie, which will be used to simulate Earth's surface as the students mine for coal. The cookies will not be handed out right away to avoid distraction.
6. Finally, after the experiment, the teacher will take up all the materials before she facilitates class discussion. This will remove distractions so that students can focus on the teacher.

Learning Theory:

This lesson closely aligns with the theories proposed by John Dewey. This theorist believed that students learn best when they are engaged in hands-on activities that

connect to their learning. For instance, to understand how coal mining affects Earth's surface, the students extracted chocolate chips from a cookie using toothpicks. This hands-on activity demonstrates how non-renewable resources can harm the environment.