

FINDING ENERGY RESOURCES

Derricks to Desks

EDUC 992

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Anticipated Learning Outcomes

- Students will recognize that as time goes by, energy resources usually become harder to locate and recover.
- Students will conclude that the price of a particular resource directly relates to the incentive of companies to obtain it.
- Students will realize that often the obtaining of energy resources has adverse environmental consequences.
- Students will learn that technological breakthroughs commonly affect both the known energy reserves and the ability of society to utilize them.
- Students will realize that the remaining reserves of fossil fuels are hard to predict and are not known with absolute certainty.

Background

The energy game activity involves students in learning about energy sources. This game demonstrates that energy, the environment and economics are closely tied; obtaining one (energy) affects the other two (the environment is altered, and/or the costs for that energy source changes). During the course of the game and in the discussion afterwards, students will learn the concepts of scarcity, opportunity cost, net energy profit, law of diminishing returns, and that availability does not mean usefulness. This activity works well after the fossil fuels and other energy sources have been introduced to the class.

Materials

- A supply of colored plastic or ceramic beads of five different colors (black, red, white, blue, and yellow), all of the same size, and, a few larger yellow beads.

- 5 needles with thread. Have four needles thin enough to string beads, and one needle slightly too large for all the beads, except for the larger yellow beads.
- Spool of thread
- Small prize for the winning team

Procedures

1. Prior to class place beads in the following proportions into a 35mm film canister:
 - Black (coal) 50%
 - Blue (oil) 37%
 - White (natural gas) 10%
 - Red (uranium) 3%
 - Yellow (solar) a quantity exceeding coal

If possible, crush some of the yellow beads before putting them into the canisters.

2. Before the class arrives, hold the canister and heave the contents forcefully towards the ceiling so that they spread out over a wide area. An alternative is to first take a small number and place them under an object so that they are not in plain view, and then spread out the rest of the beads.
3. When class starts, divide students into five teams (or companies). Assign each team a resource by color. Do not tell them what resources are represented by the colors. Give each team a needle with a foot of string already threaded and knotted. Give the solar company the larger needle on which the normal-sized beads cannot possibly fit, but that the large-holed beads will. Try not to let them know that their needle is any different from the rest.
4. The rules are that each team will have a total of two minutes to gather and thread as many of their colored resource as possible. Tell them that the winning team will receive a prize. Only beads that are threaded will be counted. (Note later how many teams spent too much time finding and not enough time converting the resource into a usable form of energy.) Stress that they must stop when the time is up.
5. Begin the 2 minute search.
6. At the end of two minutes have teams count how many beads are now strung. Record this on the board. (During the search notice whether anyone is breaking the rules by starting early or running overtime, or whether anyone is greatly disrupting the environment.)

7. Tell students that they will have one more chance. By now the yellow team will be crying about how life is unfair (dispense the facial tissues). Repeat steps 5 and 6.
8. Make a mental note of any increased efficiency in technique or time use.
9. Tell students that there will be one more final round in which to win. This time allow four minutes.
10. Record the results of how many were gathered during round three and then total all three rounds and distribute the prizes. No doubt several groups will smell a rat by now.

Analysis & Discussion

1. Have the class attempt to correctly label each color as to the resource it represents.
2. Did any group disregard the rules and collect another color? Is this realistic? Do oil corporations buy uranium mines? Yes; this is Diversification. Energy companies can develop more than one energy source without "breaking the rules".
3. What does the prize represent? Profit.
4. In most cases the number of beads collected in round three will be less than in round two and perhaps one, even though more time was given. Why? There is a great deal of economics in this lesson. Here is an excellent opportunity to discuss:
 - Diminishing resources. We can generalize that there are less than when we started; probably less than we have now gathered are left, but we cannot determine how many are left.
 - Law of diminishing returns. Our companies invested twice the labor and perhaps capital, yet did not do better. Teams probably collected more in the first four minutes, than in the last four minutes.
 - Net energy profit. If the energy required to obtain the resource (it takes energy to get energy) exceeds the energy gathered, then there is no net energy profit.
 - Opportunity cost. Companies that divert capital to develop new resource technologies are foregoing current income or profit. Thus, perhaps the incentives must be great to forego current opportunities.
5. Ask the class if any of them moved desks, books, rugs, etc. without putting them back. How does the current environment compare with the one before you began? Does the energy gained justify the damage?

- Stress the idea of tradeoffs (coal and air pollution, or strip mining of land, etc.).
6. Were some resources harder to find than others? Is this a mirror of the real world?
 7. Now to our poor solar group. Abundance of a resource does not result in ease of gathering and especially utilization. Some solar is easily used (passive solar for heating represented by the large yellow beads). However, technological breakthroughs may be necessary to fully capitalize upon a particular source.
 8. If someone found the hidden cache, discuss the ideas of pockets of resources.

Additional Activities

- You may teach graphing concepts in recording the results of each search.
- You can give each team money, have them bid to collect a particular resource, charge them for the opportunity, and award a monetary value to each bead collected.

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This activity was adapted from Energy Tradeoffs in the Marketplace, a project of the Washington State Council on Economic Education, Superintendent of Public Instruction, State of Washington. In Energy Tradeoffs, 1980, this activity appears under the title "Geologist's Dilemma".