Classroom Activities
A High School Teacher’s Guide
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PROPERTY RIGHTS/TRAGEDY OF THE COMMONS

Paper Clip* Activity

Overview: You can run this activity with either the entire class (split into groups of 4-6) or with one group at the front of the room. The activity demonstrates how incentives cause people to act inefficiently with public goods but efficiently with their own property.

Supplies: a stopwatch, 2 paper clips per person, 1 index card per person, pen and paper for record keeping, and enough candy for prizes.

Instructions: Invite 4-6 students to gather around a table with paperclips spread around the middle. The students will have 2 different rounds, each lasting 15 seconds, to pickup paperclips from the table. If a student picks up paperclips during round 1, they are worth 1 piece of candy each. If a student picks up paperclips during round 2, they are worth 2 pieces of candy each. The students are not allowed to speak to each other in order to strategize.

Have the students close their eyes and put their hands behind their back; then say “Go,” and start the stopwatch. After 15 seconds, record the number of paperclips each student picked up during round 1. Then begin round 2, and allow for 15 seconds again. Then record the number of paperclips each student picked up during round 2.

Distribute the candy according to the instructions – 1 piece for every paperclip in round 1; 2 pieces for every paperclip in round 2.

Ask students to calculate the maximum yield for the group. (If there are 5 students, there will be 10 paperclips, so the maximum yield is 20 pieces of candy.) Then ask them to compare their (or their group’s) yield to the maximum. (In this round, students almost always pick up every single paperclip in round 1, so the yield is typically 10 pieces of candy, half of the maximum.)

Give an index card to each student, and place two paperclips on each index card. There are now no paperclips in the middle of the table. The index card represents a private property, owned by each student. No other student may touch another student’s private property or paperclips in that property.

Again, they are not allowed to speak to each other in order to strategize.

The same rules apply – 1 piece of candy for each paperclip picked up in round 1, 2 pieces of candy for each paperclip picked up in round 2. Run each round again. Then ask the students to calculate their yield and compare it to the maximum yield again. (In this round, students typically wait until round 2 to pick up their paperclips, so the group’s yield is typically equal to the maximum yield.)

Discuss: Some sample questions are below.
What was your strategy for the first game?
What was your strategy for the second game?
Why did your strategy change?
What role did private property play in your strategy?
What connection do you see in the world today?

*Pennies or other objects can be used.
Tragedy of the Commons Simulation

The full document can be found at:
http://apcentral.collegeboard.com/apc/members/repository/ap03_apes_tragedy_stu_35071.pdf

Abstract
This activity allows students to explore the "Tragedy of the Commons" in which common usage of a limited, potentially renewable resource invariably leads to its exploitation. In this simulation, students imagine that they are fishermen sharing access to a common fishing pond. The fish are Hershey's kisses. Two different stages of the simulation are performed. In the first, students are not allowed to communicate, and each fisher has no knowledge of how many fish have been taken before them. In the second, students are allowed to strategize, plan, and learn from their experiences. In this way, the ability (or not) to communicate is the independent variable, and the size of the resource over time is the dependent variable. At the end of this simulation, students should have an understanding of what leads to the "tragedy of the commons", and what can be done to prevent it.

Objectives

- Understand the conditions that lead to a "tragedy of the commons".
- Learn strategies that prevent the destruction of a common resource.
- Apply these strategies to global environmental issues and suggest solutions.

Introduction
The purpose of this simulation is to explore how resources are used and exploited when they are available to multiple parties. When Garrett Hardin (1968) first proposed this concept, he used the example of the traditional "commons" in New England towns to signify a public resource available for private gain. In this case, the commons was used for grazing the townspeople's livestock. He demonstrated the idea that a small increase in use of the resource (e.g., one extra cow) provides a great benefit to an individual, while the cost of that additional use (decreased grass supply) is shared by all. Therefore, each user has an incentive to use (and exploit) the resource to the greatest of his or her ability. Ultimately, there is a decrease in yield for both the group and the individual.

This idea has been adapted to explain the pattern of overuse of many common, limited resources. For example, the exploitation of wild populations (ex. over-fishing), the abuse of public lands (ex. overgrazing on federal lands) and population growth can all be evaluated using this principle. Even a clean school campus (and the treatment of it by trash-leaving students) can be explained by the tragedy of the commons.

Fortunately, there are strategies that can be employed to ensure the long-term survival of a resource in spite of the natural tendency toward exploitation. Several are explored in this activity. These are incentives, privatization, communication, and education. With these solutions in hand, strategies can be devised to help protect common resources in the environment and work toward sustainable resource use.
Materials
For each group of four

- Hershey's kisses
- Plastic spoon
- 400 ml beakers
- Fabric sleeve

Procedure
Part 1:

Divide yourselves into groups of four. Imagine this scenario. Each person represents the head of a starving family, which requires food. The only food source for these four families is a small fishing hole, which can accommodate 16 fish. Fortunately, after each round of fishing by the four family heads, each remaining fish is able to spontaneously reproduce and make one new fish (i.e. 4 fish become 8, to a maximum of 16). Each person is allowed to take as many or few fish as you want, but if you take only one fish, your family will starve.

In this simulation, our pond is a beaker, and our fish are Hershey's kisses. Fish are caught using plastic spoons. Each fishing round will last for 1 minute. You should rotate your fishing order every round so that everyone has a chance to go first. At the end of every round, the number of remaining kisses will be doubled to simulate reproduction. The simulation will continue for three rounds. The pond will be covered with a fabric sleeve, so that it is not possible to tell how many fish have been taken before you fish. No talking is allowed in this part.

Part 2:

In this part, you will have access to two ponds, one common and one private. The rules for the common pond are the same as before. However, talking and strategizing is allowed in this part. The cloth sleeve will be removed so that you will know exactly how many fish are in the ponds at all times, and how quickly the fish will reproduce. The carrying capacity for the common ponds is 16 and for the private ponds is 4. You must remove at least one fish from each pond each round. As before, you may catch as many fish as you would like from both ponds during each round.

Data

1) All data should be recorded in the following tables.
### Part I: Commons pond

<table>
<thead>
<tr>
<th>Round #</th>
<th># of fish at beg. of round</th>
<th># of fish taken by 1st fisher</th>
<th># of fish taken by 2nd fisher</th>
<th># of fish taken by 3rd fisher</th>
<th># of fish taken by 4th fisher</th>
<th>fisher Total fish left at end of round</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part II: Commons pond

<table>
<thead>
<tr>
<th>Round #</th>
<th># of fish at beg. of round</th>
<th># of fish taken by 1st fisher</th>
<th># of fish taken by 2nd fisher</th>
<th># of fish taken by 3rd fisher</th>
<th># of fish taken by 4th fisher</th>
<th>fisher Total fish left at end of round</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Part II: Private pond

<table>
<thead>
<tr>
<th>Round #</th>
<th># of fish at beg. of round</th>
<th># fish taken this round</th>
<th># of fish at the end of round</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2) Calculate: the total number of fish caught by each person

Analysis
In your analysis, you should evaluate the results and answer the following questions.

- What happened to the common resource in the in Part 1? Why?
- Did you get different results for the pond in Part 2? Why?
- Explain the rationale for your fishing technique in each part.
- If you cooperated with other fishers, what was the result of that cooperation?
- Did you use different fishing strategies in the common pond and the private pond?
- Why does common usage lead to exploitation?
- What would be the ideal way to manage the common pond?
- How would this simulation have been different if you didn't know the students in your group?
- What are the strategies that help to prevent the "tragedy of the commons"?
- If a new student had joined your group in the middle of Part 2, how would that affect your strategy and the use of the resource?
- Why is the private pond easier to manage for long-term success?

Conclusion
Briefly summarize the results of this simulation, and discuss the implications of this simulation on the management of common resources in the environment. What other resource management examples can you think of where this topic is relevant? What would you suggest in these situations?
Tragedy of the Bunnies

Overview: You can run this activity in a classroom computer lab or assign it as homework. (Assignment questions adapted from Dr. Lauren Heller of Berry College.)

Instructions:
Go to http://www.bunnygame.org, and read the game instructions. Play both versions of the “Bunny Game,” and read “Moral of the Story.” As you play both versions of the game, record the results of each round in the tables below. When you are finished playing and reading, answer the following questions.

First Version: Keep track of how many bunnies you and your opponents capture in each round of the first version of the bunny game and record your results in Table 1.

<table>
<thead>
<tr>
<th></th>
<th># Bunnies Collected in Round 1</th>
<th># Bunnies Collected in Round 2</th>
<th># Bunnies Collected in Both Rounds*</th>
</tr>
</thead>
<tbody>
<tr>
<td>You</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opponent #1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opponent #2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total for All Players</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Note: The numbers in this column should equal the sum of the first two columns. It is possible that zero bunnies will be collected in some rounds of the game.

1. Did you capture any bunnies in the second round of play? Why or why not?

2. What types of incentives were present in each round of play? How did these incentives affect the game?

Second Version: Now keep track of how many bunnies you and your opponents capture in each round during the second version of the bunny game and record your results in Table 2.
Table 2

<table>
<thead>
<tr>
<th></th>
<th># Bunnies Collected in Round 1</th>
<th># Bunnies Collected in Round 2</th>
<th># Bunnies Collected in Both Rounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>You</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opponent #1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opponent #2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total for All Players</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. How did the rules change between each version of the game?

5. Did you capture any bunnies in the second round of play? Why or why not?

6. How did the rule changes affect the profits that you and your opponents were able to receive individually? What about as a group?

7. You are the mayor of Bunnytopia, a bunny farming community. What do you think a good policy would be to help bunny farmers and the bunny population? Be sure to justify your answer with detailed explanation and examples.
Trade Activity

Overview: Students learn gains from trade and the importance of property rights and rule of law firsthand.

Supplies: a brown paper bag with at least one item per person (the more variety of items, the better), a stopwatch, score sheet (instructions below)

Instructions: Prepare a score sheet with on the board or in an excel document. Have the students sit in groups of 4-6. Give each student a closed bag, and instruct them not to look inside. Before opening the bags, have the students rate their current level of happiness on a scale of 1 (unhappy) to 5 (very happy) for Round 1. Record the number of students who voted for each level of happiness and calculate the total happiness by adding the products of the level of happiness and the number of students (example below). For Round 2, have the students open their bags and rate their happiness again. For Round 3, allow the students to trade items (voluntary trades only!) within their group of 4-6. For Round 4, allow the students to trade with anyone on their half of the room. Finally, all free trade for Round 5.

Blank Score Sheet

<table>
<thead>
<tr>
<th></th>
<th>1 (unhappy)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5 (very happy)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Round 3</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Round 4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Round 5</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example Score Sheet (based off of 19 participants)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>10</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>33</td>
</tr>
<tr>
<td>Round 2</td>
<td>9</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>Round 3</td>
<td>6</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>42</td>
</tr>
<tr>
<td>Round 4</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>60</td>
</tr>
<tr>
<td>Round 5</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>10</td>
<td>79</td>
</tr>
</tbody>
</table>

Discuss: Ask the students how their levels of happiness changed throughout the game and why; it's good to get answers from students who increased as well as those who remained stagnant or decreased. This is a great time to introduce the concepts of subjective value and gains from voluntary trade. Ask students to consider how their behavior would have changed if there had been restrictions on the number of trades, taxes on trades, or if the bags hadn't been their own private property.
Variations: This is an easy game to put your own touches on. Some examples include: tell 2 students they represent North Korea and Cuba and are therefore not allowed to trade; levy taxes on students; etc.
Earning a Living in Econoland

This game is already well written/planned out in pdf form, and widely available on the internet.

A Market for Crude Oil

This game is already well written/planned out in pdf form, and widely available on the internet. http://www.learner.org/workshops/economics/support/econclass_wk2.pdf
COMPETITION, MONOPOLY, AND ENTREPRENEURSHIP

Chocopec

Overview: Students learn how incentives and self interest motivate decision making, even when in a group situation.

Supplies: 4 Hershey kisses per student, one box of assorted chocolates

Instructions: Tell the students that you are forming a cartel on chocolate and will be asking them to join you and will have the option to vote on whether or not they want to join. They can either collude and join the cartel of Chocopec or dissent and not join Chocopec.
If everyone in the room votes to collude, then everyone will receive 4 Hershey kisses. If there is 1 dissenter, then that one person gets the box of assorted chocolates. (It’s important for there to be significantly more people in the room than chocolate in the box, so the dissenter can’t share the chocolate with everyone.) If 2 or more people dissent, then no one gets either chocolate.
Have everyone close their eyes and hold the vote. Then distribute the kisses to everyone, the box to one person, or do nothing, based on the outcome of the vote.

Discuss: This is a great time to talk about self interest and incentives. People act in their own self interest, which is why cartels are unsustainable in the long run. If a group of people colludes to keep prices high, then someone in the group will undercut everyone else to have the best price, and soon, others will follow suit. Also, incentives matter! Ask students why they voted the way they did to see what motivated them.
Class Survey

(adapted from Risks and Rewards of Entrepreneurship, Ashmore, Fischer et al.)

Overview: Have students gather data about the class in order to come up with a product that would be useful to the class.

Supplies: Depends on how you want to run the survey, if you want to design one or use the example

Instructions: (these instructions are based off of one way to conduct the survey, but there are many possible variations.)

Post a class survey (you can find an example here: http://www.entre-ed.org/_teach/act-surv.htm but feel free to make your own) on an overhead projector. Have the students answer the questions by moving around the room or standing up, so there's more interaction than just raising a hand or marking their answer on a piece of paper. Record the numbers after each question on the overhead, so the data is visible to everyone.

After the survey, have students answer the question "What products or services would you like to purchase at school that currently can't be bought there?" by themselves on a sheet of paper. Then allow them to get into groups of 2-3 to come up with products and services that they think would sell best at school, assuming their survey results are a representative of the whole school. Let the groups present their ideas to the class and allow everyone to vote of the best product or service.

Discuss: Talk about how entrepreneurs identify unmet market demands, and then enter the market to meet those demands. You can also talk about how there needs to be a market demand for a product in order for it to be successful (i.e., selling dentures in a high school will probably not be successful).