SIMULATING THE WORLD: GAMES

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GENERAL GUIDE

In a game, students take on the role of a stakeholder in a sustainability problem. This experience is a fun way to illustrate complex concepts and processes. It engages students through empathy with an avatar / role in game, giving them a sense of agency and meaningfulness, as well as a safe place to practice problem solving where consequences of mistakes are brief (and not shaming) so students can focus on learning. Since many games have already been carefully designed by education and sustainability specialists, little planning or expertise is needed from instructor.

Students who play transformationally become agents-of-change who use real-world knowledge, skills, and concepts to make sense of a situation and then make choices that actually transform the play space and themselves; creating a place in which what you know is directly related to what you are able to do and, ultimately, who you become. - Sasha Barab, 2005

<table>
<thead>
<tr>
<th>Course</th>
<th>Level: 300; can accommodate group size: 3-20</th>
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</thead>
<tbody>
<tr>
<td>Enjoyment</td>
<td>Give students a sense of control, agency, and meaningfulness (Gee, 2005).</td>
</tr>
<tr>
<td>Learning</td>
<td>Can illustrate complex concepts and processes. Gives students an opportunity to draw on knowledge, skills, and attitudes to solve problems. Provides safe space to learn from mistakes (Barab, 2009). Can also inspire empathy and motivate action outside of the game setting (Gee, 2005).</td>
</tr>
<tr>
<td>Adjustments</td>
<td>Requires few adjustments beyond creating assignment, discussing experience afterwards to make sense of contextualized learning, and helping students channel insight and empathy into constructive activities.</td>
</tr>
<tr>
<td>Benefits</td>
<td>Requires few adjustments and provides students with an intensely personal</td>
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real-world learning experience.

**LEARNING OBJECTIVES**

- Make links between lessons learned in game and their relevance in real-world contexts. [Systems Thinking]
- Distinguish and explain the perspectives of persons and groups accounting for history and context. [Values Thinking]
- Demonstrate ability to improve sustainability problem solving in game. [Strategic Thinking]
- Empathize with person or groups assumed in game roles [Interpersonal Competencies]

**ACTIVITIES**

The purpose of game activities are to bring students into contact with a simulated real-world, but more importantly to give them a space to develop agency, control, and meaningfulness while practicing complex decision making (Gee, 2005, Barab, 2009). In this experience, students take on a role to play out, often through a figurine or avatar, in a traditional or virtual game. The students role is to assume the role seriously, and also think critically about how knowledge, skills, and attitudes learned through the game are relevant for sustainability solutions in the real-world. The instructor’s role is to create clear instructions for students before the game, and help students link game experience to course content and the real-world afterwards through discussion or assignments. This is important for students get the most out of a game: “Merely playing a game does not ensure that a student is engaged in transformational play. To play transformationally, a play must become a protagonist who uses the knowledge, skills, and concepts embedded in curricular content to make sense of a fictional situation and make choices that transform that situation (Barab, et al., 2009, 77).”

Games are often good ways to engage students around “global, politically sensitive issues” and help them grapple with values and ethics. For example, The River of Justice, an educational video game, focuses on recent events in Uganda: “[P]layers to experience the atrocities and inhumane conditions and, by illuminating such values as peace and justice, helps them more generally to appreciate the moral complexity of a humane intervention. Rather than theoretical constructs to be debated in the abstract, the ethical struggles involved in determining a humane intervention in the game setting are grounded in different Non-Player Characters’ perspectives and operationalized within the underlying game dynamics (Barab, et al., n.d).

Games can also be a safe space to develop mastery in problem-solving through making mistakes. “If a student’s actions lead to disastrous in-game consequences, help students use this feedback strategically, rather than penalizing them. When you first introduce a virtual game, tell students that they should expect to experience failure and have times when they must go back and start over. This will go a long way in coaching students to think of negative outcomes as an opportunity to improve rather than a message about failure (Barab, et al., 2009, 80).”
Game theorist James Paul Gee sees video games as food for the soul, a dimension of the person often ignored in traditional education. He writes “If people are to nurture their souls, they need to feel a sense of control, meaningfulness, and even expertise in the face of risk and complexity. They want and need to feel like heroes in their own life stories and to feel that their stories make sense. They need to feel that they matter and that they have mattered in other people’s stories. If the body feeds on food, the soul feeds on agency and meaningfulness....of course the hope is that this food will empower the soul to find agency and meaning in other aspects of life (Gee, 2005, 4).

Timeline:

- Introduce game and rules.
- Coach students while playing, answering questions and prompting students to take notice of important concepts, skills, challenges, paradoxes, mistakes, solutions, etc.
- Facilitate discussion with students immediately afterwards to link game experience to real-world sustainability problems and course concepts.
- Prompt students to replay the game with discussion in mind, look for increased mastery and new lessons learned.
- Assign essay or other concluding activity.

ASSIGNMENTS AND ASSESSMENT

The assignments below can maximize learning outcomes of the game experience and produce outputs that can be assessed to determine achievement of the learning objectives.

- **Discuss** the experience of playing the game, what knowledge, skills and attitudes were learned, and how they relate to solving relevant sustainability problems in the real-world. Output: participation.
- **Write** an essay considering the impact of assuming another role through the game, lessons learned through the game, and how the simulated experience can be linked to real-world action. Output: essay.
- **Replay** game after discussion with instructors and peers the experience, mistakes made and their consequences, and lessons learned. Output: game performance.

Use a Likert-scale to determine if students achieved all, most, some, little, or none of the learning objective. Develop a rubric with examples of answers that demonstrate students have achieved all (5), most (4), some (3), little (2), or none (1) of the objective.

TAKE THIS EXPERIENCE TO THE NEXT LEVEL!

- **Engage the world**: Have students complete collaborative research projects or take civic action on the sustainability issues central to the game.
BIBLIOGRAPHY & RESOURCES

- River of Justice, Virtual Mesa Verde, Quest Atlantis, etc.
  http://playablefictions.com/category/our-games
- Edutopia Interview with Sasha Barab:
  http://www.youtube.com/watch_popup?v=1GBDAAxEvDo


GAMES EXAMPLE: FISHING

SUMMARY
The world’s major fish stocks are being depleted due to overfishing, meaning fish are being fished at or beyond the biological limits of the system. Only 10% of large species like Tuna, Swordfish, and Halibut remain. This game was developed by the Cloud Institute for Sustainability Education and adapted by Dr. Erin Frisk Redman to introduce students to the concepts of carrying capacity, the tragedy of the commons, and future thinking in sustainable management of natural resources.

“When we start thinking about the Earth as a shared resource, the norms we take for granted in the business world don’t apply. Some of our mentality about what it means to have a good life is, I think, not going to help us in the next 50 years. We have to think through how to choose a meaningful life where we’re helping one another in ways that really help the Earth.” - Elinor Ostrom

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<thead>
<tr>
<th>Course</th>
<th>Level: 300; can accommodate group size: 3-100+</th>
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<tbody>
<tr>
<td>Enjoyment</td>
<td>Students quickly get into game activities.</td>
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<tr>
<td>Learning</td>
<td>Illustrates concepts that may seem abstract. Helps students understand problem of overfishing and consider solutions for long-term natural resource management.</td>
</tr>
<tr>
<td>Adjustments</td>
<td>Easy to implement in class. Takes little preparation beyond printing out game materials. Other industries and resources can be substituted for fishing and fish.</td>
</tr>
<tr>
<td>Benefits</td>
<td>Quick and easy way to introduce new concepts. Gets students interacting in class. Provides basis for discussion grounded in activity experience.</td>
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LEARNING OBJECTIVES
- Make links between lessons learned in game and their relevance in real-world contexts. [SYSTEMS THINKING]
- Explain how future thinking can support sustainable management of natural resources. [FUTURE THINKING]
- Evaluate whether or not the tragedy of the commons is the inevitable strategy. Provide evidence from the game and from assigned reading. [STRATEGIC THINKING]
- Demonstrate ability to improve sustainability problem solving in game. [STRATEGIC THINKING]
- Empathize with the situation and decision-making frame of the fishermen [INTERPERSONAL COMPETENCIES]
- Define and provide examples of “carrying capacity” and “tragedy of the commons”. [BASIC ACADEMIC COMPETENCE]
ACTIVITIES
The purpose of this activity is to familiarize students with concepts of carrying capacity, the tragedy of the commons, and future thinking in sustainable management of natural resources. In this activity, students run a swordfish fishing industry. Each person in the group (3-4 people per group) will be fishing for swordfish in the same ocean. One person in the group will be the banker (“nature”); the banker is also a fisher-person. The banker is in charge of the envelope id fish used for ‘restocking’ and calculating the number of fish taken, left, and number of fish that get restocked each round.

Twenty fish is the ocean’s carrying capacity for swordfish. In each round, each person can fish for a certain number of swordfish. Traditionally, people fish for swordfish in the three following ways:

1. Harpoon fishing: take one fish
2. Long line fish: take two fish
3. Free-for-all long line fishing: take three fish

Each turn, each person can take up to 3 fish. You have 10 days to catch as many fish as you can. The money you make from these fish will need to support your family for the next month. Each fish nets $2. Each day, you'll choose whether you want to take none, one, two, or three fish for the day. After each round when all players have taken their fish, the banker (“nature”) will count the number of swordfish left and add 25% to the pot, up to, but not exceeding, 20 fish. Example: If there are 12 fish left, 3 fish (25% of 12) will be added to the pot, bringing the total up to 15. If there are 19, they will multiply to 20. In real life, swordfish produce far fewer than 25% new offspring each year— they are like humans in that they have few children over the course of their lifetimes. The added fish represent the number of baby swordfish made by the swordfish that were left after everyone has taken their fish (the ones that were left in the ocean to reproduce). The object of each game: To have as many fish as possible after playing all 10 rounds.

After playing one round of the game and discussing using the assessment prompts below, have students create rules for a sustainable fishing plan. Play a second round and discuss how the plan impacted carrying capacity and whether or not they might help people avoid the tragedy of the commons. Consider how rules might be enforced, what unintended consequences they might have, and how they might be avoided.

Timeline
- Print materials (points recording sheet and fish cards).
- Introduce activity in class at a relevant point in the semester.
- Once students are playing, circulate among groups to observe.
Facilitate group discussion to enhance learning and gauge achievement of learning outcomes.

ASSIGNMENTS AND ASSESSMENT
The assignments below that can maximize learning outcomes of the game experience and produce outputs that can be assessed to determine achievement of the learning objectives.

- **Discuss** the activity. Output: Notes from game, participation.
  - What strategy was the most economically viable for 10 rounds?
  - How does this relate to broader issues of tragedy of the commons?
  - What strategy is best for the individual in the short-term (the first 3 rounds)?
  - What strategy is best for the individual in the long-term?
  - 10 rounds represents 10 years, do you think that most people think that far into the future & how does the presence or lack of foresighted thinking impact sustainability?
  - How did the rules implemented in the second round impact carrying capacity. Consider how rules might be enforced, what unintended consequences they might have, and how they might be avoided.
  - Is the tragedy of the commons inevitable?

- **Read**

- **Write** an essay in which you take a stance on whether or not the Tragedy of the Commons is inevitable. Use and cite both articles above as well as any additional peer-reviewed articles or books of your choice. Output: 2-3 page essay.

Use a Likert-scale to determine if students achieved all, most, some, little, or none of the learning objective. Develop a rubric with examples of answers that demonstrate students have achieved all (5), most (4), some (3), little (2), or none (1) of the objective.

TAKE THIS EXPERIENCE TO THE NEXT LEVEL!
- **Visit the World**: Identify local common pool resources that are or are not managed sustainable and organize a field trip. Consider how the scenario observed is similar to and different from the experience students had in the game.

BIBLIOGRAPHY & RESOURCES

GAMES EXAMPLE ASSIGNMENT: FISHING

SUMMARY:
The world’s major fish stocks are being depleted due to overfishing, meaning fish are being fished at or beyond the biological limits of the system. Only 10% of large species like Tuna, Swordfish, and Halibut remain. This game, developed by the Cloud Institute for Sustainability Education and adapted by Dr. Erik Frisk Redman will familiarize you with the concepts of carrying capacity, the tragedy of the commons, and future thinking in sustainable management of natural resources.

INSTRUCTIONS:
There are four parts to the assignment: the game, the discussion, the reading, and the essay.

Game:
First, you will play the game. Groups of 3-4 people will fish from one ocean. One person in the group will be the banker (“nature”); the banker is also a fisher-person. The banker is in charge of the envelope with the fish used for ‘restocking’ and calculating the number of fish taken, left, and number of fish that get restocked each round.

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During the game, have at least one person in each group take notes on observations.

Discussion
• What strategy was the most economically viable for 10 rounds?
• How does this relate to broader issues of tragedy of the commons?
• What strategy is best for the individual in the short-term (the first 3 rounds)?
- What strategy is best for the individual in the long-term?
- 10 rounds represents 10 years, do you think that most people think that far into the future & how does the presence or lack of foresighted thinking impact sustainability?
- How did the rules implemented in the second round impact carrying capacity. Consider how rules might be enforced, what unintended consequences they might have, and how they might be avoided.
- Is the tragedy of the commons inevitable?

Reading

Essay
Write an essay in which you take a stance on whether or not the Tragedy of the Commons is inevitable. Use and cite both articles above as well as any additional peer-reviewed articles or books of your choice. Output: 2-3 page essay.

Learning Objectives:
- Define and provide examples of “carrying capacity” [Systems Thinking].
- Describe and provide examples of “tragedy of the commons” [Systems Thinking].
- Explain why future thinking is important for sustainable management of natural resources [Systems and Future Thinking].
- Take a stance on whether or not the tragedy of the commons is inevitable. Provide evidence from the game and from reading.

You will be evaluated on how far your written newspaper article and reflection demonstrate your achievement of these learning objectives.