

Build a Catastrophe: Using Digital World and Policy Models to Engage Political Science Students with Climate Change

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Existing Course (POS 348 - Do You Want to Build a Nation?)



Nation-Building Phase

- Students split into 8 nations + 1 non-state actor, each with different ideologies
- Students develop nation-specific policies on various topics (drones, women's rights, etc.)
- Feedback on policies comes from other classmates and instructor
- No policy consequences



Diplomacy Phase

- Students resolve 9 diplomatic incidents (ethnic cleansing, territorial disputes, etc.)
- Students negotiate treaties and alliances between their countries
- "Event points" awarded for achieving nation-specific goals

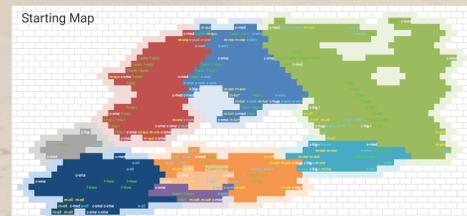
Overall Course Goals

Students learn about different regime types, defend and evaluate key principles of different ideologies, and develop verbal and non-verbal communication skills essential in diplomacy and negotiation.

Digitization Goals

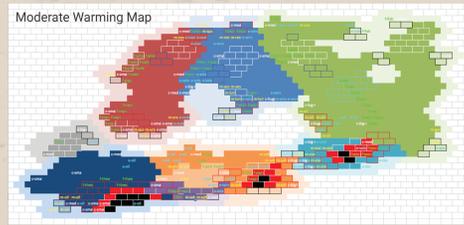
- Create ability to offer the course at scale
- Constrain student decision-making to remain true to each country's ideology
- Introduce students to real-world information gathering to inform decisions
- Build in geological/climate models to tie country policies to environmental realities

Digital Map Features



- Underlying simple geologic and climate model determined microclimate of each tile
- Crops, mines, and power plant placement restricted by geology and climate of each tile
- Prototype game engine built in Excel for future integration with prototype map rendering tool built in Unity

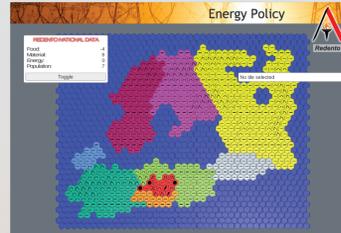
Major climate patterns represented on the map included wet/dry patterns produced by global circulation patterns and rain shadows from mountain ranges. Climate change effects included sea level rise, salinization of groundwater, karstification of carbonate topography, and changes in rainfall and wind patterns.



Black outlines = land lost to sea level rise; yellow outlines = karstification; aqua outlines = groundwater salinization; blue outlines = increased rainfall; red outlines = decreased rainfall; red infill = desertification; black infill = previous desertification; white outlines = carry-over effects from low warming scenario

The simple climate change model here shifted wet/dry bands and global wind patterns northward as the planet warmed.

Energy Policy Activity



Map and Introduction

This screen loads the map and tile info for each country. Example shown here is Redento (red region), a break-away region from Dacca (mint green country). Governance type is tribunal of warlords. Because Redento is not an officially recognized country, it does not have a capital.

Students proceeded through this activity twice: first individually to explore a desired set of policies, then as a team to make a final decision after comparing their individual outcomes.

- Symbology
- ★ = capital
 - = city
 - ⚡ = energy
 - 🌾 = food
 - ⚙️ = material

Energy Audit Activity

Students explore the map to determine overall energy production/consumption, energy production by type (renewable vs. non-renewable), and production/consumption by region.

Policy Objective

Students explain their energy policy aims (increase production, decrease consumption, export energy to neighboring countries, greenify the power grid, etc.) and justification.

Explorer

Students explore available policies and country regions. Policies outline available policies, costs, and environmental impacts. Regions display opinion pieces, polls, newspaper articles, and video clips to flesh out the culture/history of each region and imply political impacts of decisions.

Policy Implementation

Students make policy decisions and then implement them, which impacts the map in pre-determined semi-randomized ways. There are three basic policy-making models:

- Centralized power (students can make tile-level decisions)
- Absolute monarchy, oligarchy, theocracy, socialist state
- Semi-centralized power (students choose which policies to bring to a vote)
- Social democracy, neoconservative state
- Decentralized power (student actions have no impact on outcome)
- Pure democracy, libertarian state, warlord council

Reflection

Students reflect on their desired policies, the compromises they needed to make to cope with political realities and available policies, and the outcome of their implemented policies (including unintended side effects like protests or a population boom).

Climate Change Diplomacy

Individual country energy policies collectively yielded a small global increase in use of fossil fuels. This yielded a "moderate" warming scenario that would be implemented incrementally by the end of the semester if no diplomatic solution for emissions reduction was reached. The digitized prototype allowed direct linkage of student's internal policies with global consequences.

Diplomacy Objective

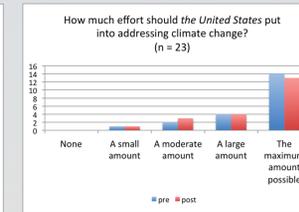
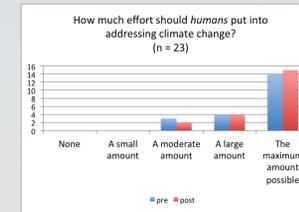
Global climate accord that reduces global emissions by 80% to avoid all warming consequences, 50% to avoid moderate warming scenario (and triggering a "low warming" scenario instead).

However ...

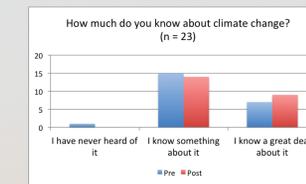
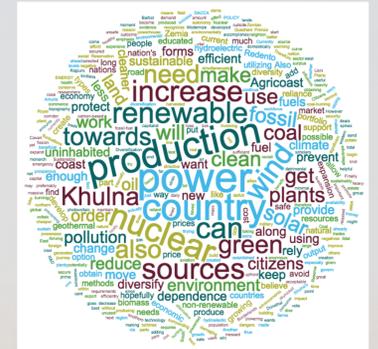
Individual countries earned event points based on selfish objectives. For example, some countries won event points by joining a global agreement, others by sinking a global agreement, and still others by ensuring their coal plants stayed open to avoid internal strife.

Attitudes about Climate Change

Most students are familiar with the concept of climate change and felt that their knowledge about the topic increased as a result of the activity. Survey results showed that students favored maximal national and global efforts to address the problem. Stated policy objectives and in-game preferred policy options were strongly in favor of renewable and green energy sources.



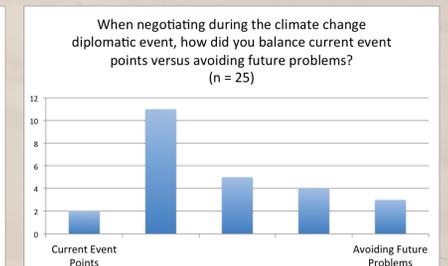
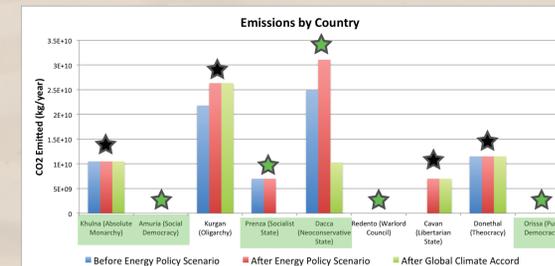
Explain what your energy policy objective is and why.



Scenario Outcomes

Students were presented with the detailed consequences of low and moderate warming scenarios (sea level rise, salinization of coastal aquifers, increased flooding, desertification, etc.) via the digital map prior to negotiation. They were also informed of negative impacts on food and military resources for future diplomatic events.

After 1.5 hours of negotiation, students signed a 5-nation pact that reduced emissions from those five nations by 60% through a combination of shutting coal/oil plants, reducing national energy usage, and implementing battery technology to minimize energy waste. Instructor observation of the negotiations revealed students utilizing data and information from the digital experience to inform the details and urgency of negotiations. The final agreement was specific in how students planned to reduce emissions (shut down plants, harvest waste energy, Dacca will import energy from Khulna, Prenza will share technology, etc.), whereas in previous semesters, agreements were much more vague (i.e. "we agree to reduce emissions").



Countries highlighted in green signed the 5-country emissions reduction pact (Khulna, Amuria, Prenza, Dacca, Orissa). Green-starred countries were incentivized to reduce emissions due to catastrophic impacts (Prenza, Dacca, and Orissa) or international prestige (Amuria, Redento). Black-starred countries were incentivized to block or reduce the impact of the global agreement for political (Khulna), business (Kurgan), ideological (Cavan), and religious (Donethal) reasons.

Course Outcome

Despite the agreement, global emissions were only reduced by 30%, resulting in failure of the global climate accord to avoid the moderate warming scenario. Countries suffered food and military penalties (and some bonuses) in the subsequent diplomatic event as a result of climate change. When given a second chance to limit the damage to a "low warming" outcome by limiting emissions, students again failed, resulting in more catastrophic climate change and associated penalties for the final diplomatic event. Front-runners in the game were eliminated because of the financial impact of climate change. Final winner of the game was Redento (the region least impacted by climate change).

Conclusions

- Students reported many benefits from using the digital prototype (better world-building, more information for decisions, ability to observe consequences, being forced to work within confines of their governance type).
- Students are in favor of strong real-world action on climate change and made internal energy policy decisions for their countries accordingly.
- Students made more informed policy decisions as a result of pre-testing policies in the digital prototype (compared to previous semesters where an uninformed majority or the loudest voice would dominate decisions).
- The digital diplomacy model was referenced and used in negotiations, making negotiations and signed treaties more specific compared to previous semesters.
- Despite difficulty of the scenario and multiple failures to solve it, students remain optimistic that they can have a strong impact on the climate change problem in the real world.