RESPONDING TO CLIMATE CHANGE -- INTERACTIVE COURSE

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Environmental Research Goals

Questions '68-'88	Questions + Problems '88-'08	Questions + Problems +Solutions '08+
Wilderness/natural	Society	Development
Basic	Applied	Practice
Discovery	Integration	Application
Global	Regional	Local, Stakeholders
Understanding	Mitigation	Adaptation
Awareness	Concern, Policy	Values, Decisions, Behavior
Resource Use	Management	Stewardship, Design
Spatial and Temporal	Processes, Trends	Vulnerability, Resilience
Analysis	Synthesis	Conflict resolution
Academia	Societal relevance	Action orientation

Environmental Research Approaches

Questions '68-'88	Questions + Problems '88-'08	Questions + Problems +Solutions '08+
Geology/Earth Science, Biology, Natural Resources, Sociology, Philosophy, Literature	Engineering, Political Science, International Affairs, Economics, Geography, Chemistry, Public Policy and Administration	Psychology, Ethics, History, Anthropology, Public Health, Arts, Business, Religion, Planning (urban and rural), Built Environment (Landscape Design and Architecture)
Hypothesis	Monitoring	Challenge
Reductionist	Systems	Complex systems
Data generation	Data mining	Data capture
Observer	Advisor	Participant
Expert individual	Team/collaborative	Citizen science, Crowd-sourcing
Department co-authors	Distributed co-authors	Stakeholders

Environmental Education Approaches

Professor-centered '68-'88	Professor -centered + Participatory '88-'08	Professor + Participatory + Student-centered '08+
Disciplinary	Multidisciplinary	Interdisciplinary, theme-based (water, climate, energy, sust devel)
Lecture and field/lab	Hands-on	Service learning
Sage on stage--content	Guide on the side	Moderator/facilitator—skills
Lecture halls/labs	Seminar rooms	On line
Reading--cognitive	Doing--kinesthetic	Feeling—affective/conative
Individual	Group/team	Practitioners
Foundation/sequence	Lateral	Just in time
Textbooks	Articles/readers	Internet
Syllabus	Course objectives	Student learning outcomes
Tests and papers (cognition)	Oral presentations, posters	Multimedia e.g. videos, blogs, wikis, PSAs, reflections (metacognition)
Learning	Communicating	Responsibility, management, entrepreneurship

Responding to Climate Change Syllabus

- Global climate change projections
- Adaptation and response options
- Arctic case study
- Global Water case study
- Global Health case study
- Conflict case study
- New York City case study
- Adaptations analysis presentations
- Climate change mitigation and the carbon cycle
- Enhanced sinks I: carbon capture and geologic sequestration
- Enhanced sinks II: land use
- Geoengineering
- Decision making and behavioral change
- Communication and skeptics
- Mitigation analysis presentations

Polar Learning And Responding:

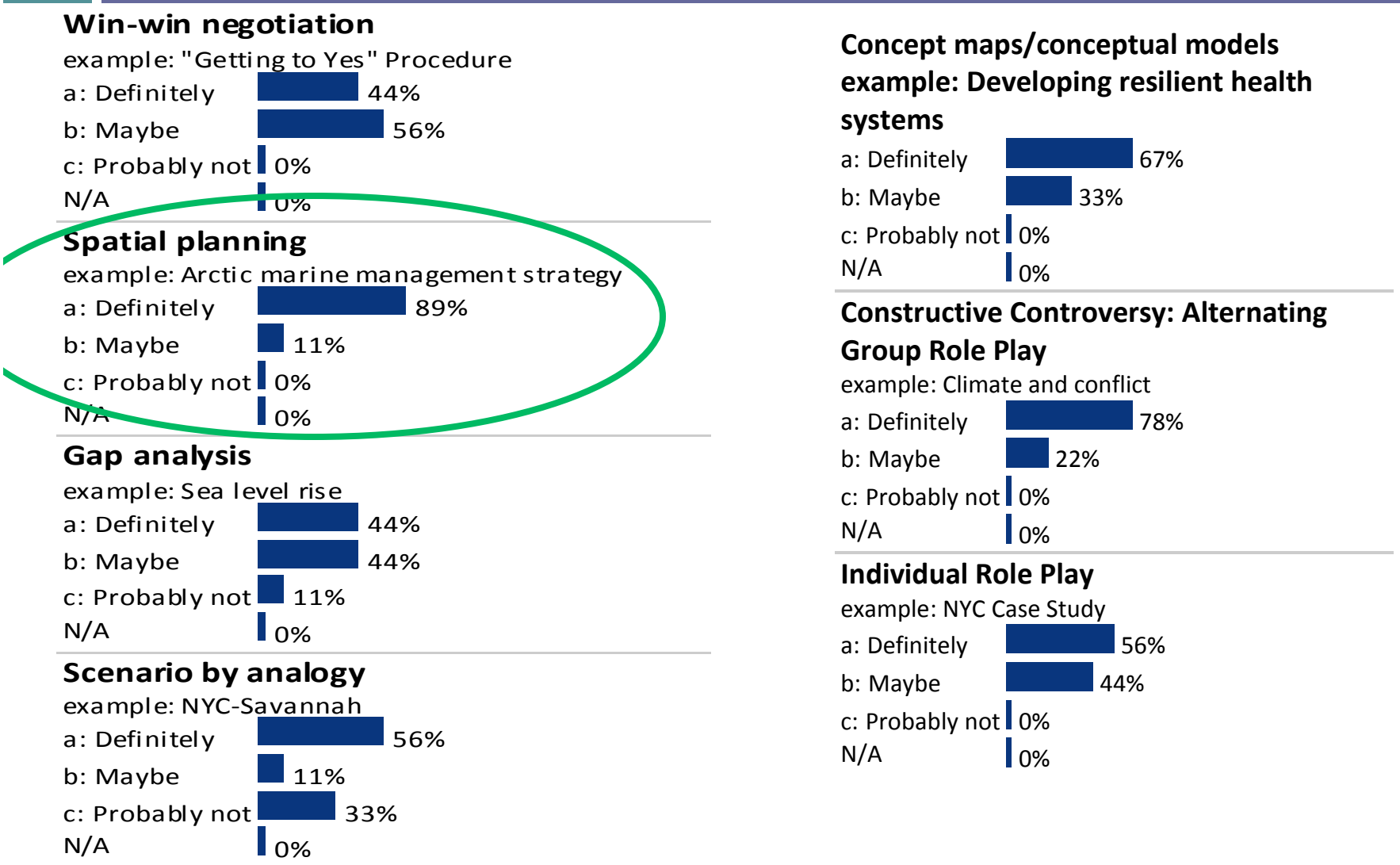
POLAR CLIMATE PARTNERSHIP

Columbia Climate Center At The Earth Institute
Columbia University Center For Research On Environmental Decisions
Barnard College
Teachers College
University Of New Hampshire
University Of Alaska-Fairbanks
International Arctic Research Center
American Museum Of Natural History

Grant from National Science Foundation

Transforming climate change from a contentious issue to a personal, professional, and community challenge

Which of the following tools would you choose to use if you had to come up with an adaptation plan for some region or sector?



Arctic SMARTIC:

Strategic **MA**nagement of **R**esources in **TI**mes of **C**hange

- Marine Spatial Planning
- Google images
- Stakeholder role playing
- "Getting to Yes" negotiation strategy

Upper Level Undergraduate Majors

- This was a great, interactive way to gain exposure to different factors influencing the debate about the ever more desirable land and water in the Arctic. The most valuable thing that came out of this exercise was precisely the exposure and awareness of all of the different factors.
- The variety of stakeholders that exist makes coming up with viable solutions difficult. There are environmental and economic issues to consider in the short run and long run, as well as issues of international relations. All of these perspectives must also take into account the uncertainty of the models' predictions.
- I think that interactive activities like the one done in class really help students to learn because it tests our ability to analyze and interpret previous readings and discussions in a different context. Anyone can read a paper and summarize, but it takes genuine understanding to engage in an activity like this.
- I was really excited to do this activity—I felt very respected to be entrusted to use my knowledge to apply to a real world situation: like I had something to contribute to the acting (as opposed to literary) world.

Undergraduates, continued

- Combining shipping route information and mineral abundance with high fish biodiversity and mammal hotspots, as well as the locations of the highest concentration of people, helps people to visualize where action and management practices need to occur first in order to impact the highest number of stakeholders.
- … before this activity, I had thought of the stakeholders, but I thought they were all in conflict with each other; it turns out that only certain ones are in conflict with each other in certain areas.
- All in all … I left feeling hopeful and optimistic, but understanding of the tough journey ahead that will require much collaboration in order to effectively manage the Arctic.
- I am hopeful … that with our generation having more discussions like the ones we had in class, we will be better-equipped in the coming years to effectively work out solutions that can benefit all stakeholders.

Masters in Climate and Society

International Students Preparing for Decision-making

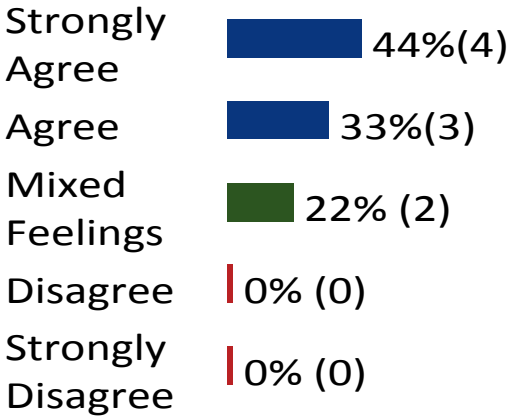
- I think it was realistic in the sense that we got a large group of people together who represented highly disparate interests and tried to hammer out an agreement. It was good to see the scope of the problem and the number of different parties who stand to gain or lose.
- Is a logical and creative way to help different stakeholders to reach agreement on the contradiction of dealing with climate change. The map show the different stakeholders' interests which reflected the complexity in real world.
- SMARTIC created a way to identify aspects of a conflict and make an opportunity to let them negotiate. Students would learn the issues, stakeholders, and interests surrounding arctic development/preservation. They would gain experience in how all of these variables interplay with one another and interact to reach a decision.
- … The "right" decision is not always black and white and there will always be winners and losers.

Masters students, continued

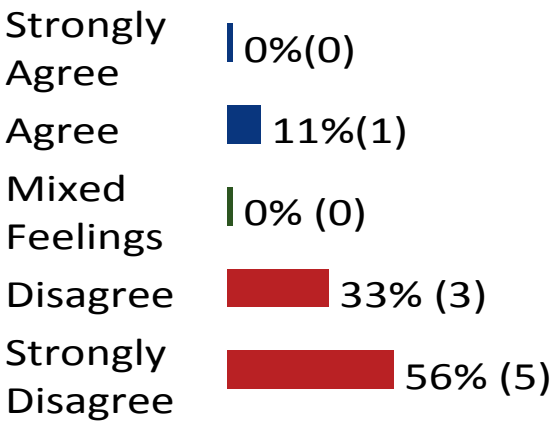
- They would learn how to consider stakeholders' benefits and try to find a better solution for different representatives of a region or area. They would also learn how to solve conflict by negotiations, and how to make a win-win result by considering interests of all. They would know all representatives should consider dealing with climate change and make compromises between each other for human being's future.
- Students would learn how problems associated with climate change in the Arctic go beyond the just the melting of sea ice. People will be affected both directly and indirectly. It's a very realistic exercise and the mapping portion in particular allows you to see how big of an area can be impacted by multiple interests.
- I thought many of the stakeholders corresponded to those in reality, and I felt it realistically captured how many disparate groups may have interests in a single area, and how the interests of those groups may not be simple to predict. Even when I felt an apparent failing--such as when, in one my groups, the person representing arctic nations did not speak up much and so there was not input from governments--it was useful because it showed what might end up in a regime without government regulation or with weak vs. strong government input.

Overall Undergraduate Course Evaluation

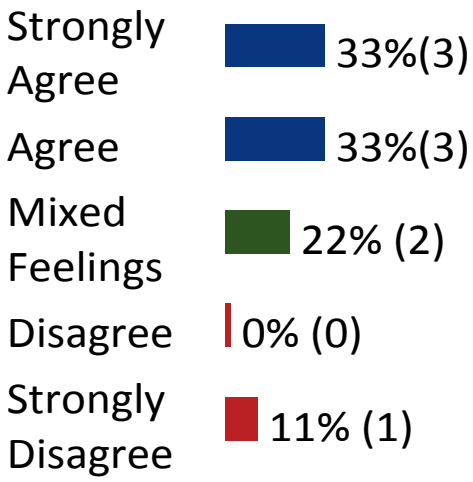
1: **I learned more from this course than a usual 3pt lecture course** n = 9



2: **I would have preferred to have more lectures and fewer activities** n = 9



4: **As a result of this course, I feel empowered to respond to climate change** n = 9



Conclusions

"I learned a variety of skills about how to make decisions and work together to address multiple concerns in a successful way regarding climate change, such as through spatially mapping different interests and designing concept maps"

- Interactive approaches work very well in teaching adaptation, and to a lesser extent in teaching mitigation
- Skills-based case studies are extraordinarily effective
- Stakeholder engagement, negotiation, conflict resolution, values landscapes are important components
- Games help students explore complexity and engage problem-solving capacities