Web Evaluation II

Background information

Active engagement of the student enhances learning. In the Global Change course, computer-based simulations allow students to perform “experiments” to help deepen their understanding of physical relationships and mathematical concepts. Two such experiments are the “Pinball Simulation” and the “Java Climate Model”. The first was created by a student in the class, and the second was created by Dr. Ben Matthews of the Georges Lemaitre Institute of Astronomy and Geophysics at Universite catholique de Louvain in Belgium. You are "visitors" to the Global Change course, and may not have a full understanding of the background for these experiments. However, you may be able to imagine how such experiments might be used in your teaching and, on that basis, evaluate the use of this technique for facilitating the learning process.

Pinball Simulation

Pinball is used to help students understand the difference between a daily weather forecast and a multi-year climate simulation. This experiment is found in Learning Unit 2-1, which discusses the general predictability of climate. Background information on the Pinball Simulation is given at http://www.meteor.iastate.edu/gccourse/model/basic/images/pinball.html, and some helpful hints for running the experiment are given at http://www.meteor.iastate.edu/gccourse/model/basic/images/helphints.html. You can access the actual experiment at http://www.meteor.iastate.edu/gccourse/pinball/WeatherSim.html.

If you would like to see how students in the Global Change course use the Pinball Simulation, go to http://www.meteor.iastate.edu/gccourse/model/basic/pinball/pinball_assignment.html.

Students in the Global Change course use the Pinball Simulation to produce simple statistical information at the bottom of the page that results from the particular starting points and peg configurations they individually choose. (Note that students can remove or add pegs by simply moving the cursor to a peg or open space and clicking.) Each student will get different results.

Java Climate Simulation

The Java Climate Simulation allows the user to gain understand of the relationships among national/global emissions of CO2, atmospheric concentrations of CO2, global average temperatures and regionally specific temperatures.

Background:

James E. Hansen, Director of the NASA Goddard Institute for Space Studies, has estimated that the maximum amount of additional global warming the Earth system can take without major effects such as eventually (not this century) melting the Greenland icepack, is about 1 degree C. He notes that during the last accelerated warming at the end of the last ice age, sea level rose by about 1 m every 20 years for several centuries. A 1 degree C rise in temperature translates into an additional radiative forcing of about 1 Watt/m2. The Java interactive climate modeling system (http://www.chooseclimate.org/jcm/) allows exploration of the relationships of emissions of carbon dioxide to global temperature increases, regional patterns of warming, increased radiative forcing, sea level rise, and many more factors. It is a much more sophisticated and professional simulation than pinball and allows for investigation of interesting questions like:

"Choose the amount of sea level rise due to global warming that you think is acceptable for Denmark (or Amsterdam or Bangladesh or wherever you like) over the next 100 years. Then use the interactive Java model to determine what maximum level of atmospheric carbon dioxide is allowable for various global climate models and the allowable CO2 emissions. From the Distribution map suggest how the various regions of the world will need to reduce their emissions to achieve this goal."

or

"To avoid setting the Greenland ice sheet on an irreversible path of complete melting (with attendant rise in global sea level of 7 meters) humans need to avoid introducing an additional 1 Watt/m2 of anthropogenic forcing. Determine the maximum atmospheric CO2 concentration to achieve this result and suggest what levels of emissions reductions are required from the US, Western Europe, Japan, etc. to achieve this goal"

Tasks for Danish Students

You are asked to play the role of student in the Global Change class and evaluate the usefulness of web-based experiments for enhancing learning. Please complete the following tasks:

1. Access the Pinball Simulation experiment and try a few simulations to learn how to use the experiment to create the statistical information at the bottom of the page.
2. Evaluate the usefulness of such web-based experiments as a technique for helping students learn. (Note: you may want to explore one or more of the experiments that the Global Change students are asked to do. See http://www.meteor.iastate.edu/gccourse/model/basic/pinball/pinball_assignment.html
3. Access the discussion pages in your portfolio and post (as a reply to the thread "Web Evaluation II") your views and opinions of the usefulness of web-based experiments such as Pinball or Java Climate Model as learning tools.
4. Comment on the relative advantages or disadvantages of using a student-created simulation (Pinball) as opposed to a professionally generated simulation (Java Climate Model).
5. Read the comments posted by other students and post one comment or more on the opinions expressed by another student.

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