

Using Blackboard to Create Online "Warm-up" Exercises for a Climate Change Course



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What is a "Warm-up"?

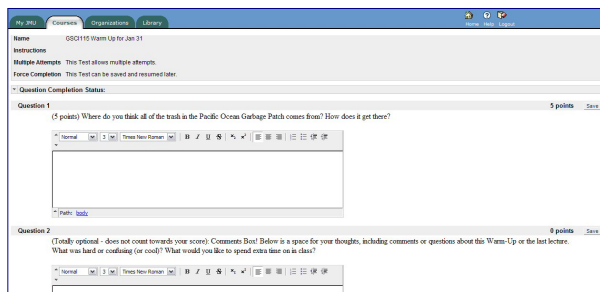
- An activity that acts as a "springboard" for students to evaluate their understanding of concepts from reading before they are covered in class.¹
- Can be an open-ended question, quantitative problem solving, mini-field trip, etc.

Objectives

- Improve teacher-student feedback in large general education courses with no lab.
- Discourage procrastination in completing reading assignments and studying for tests.

Methods

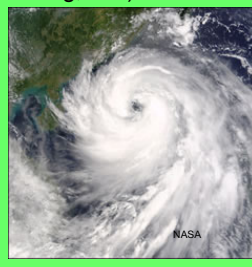
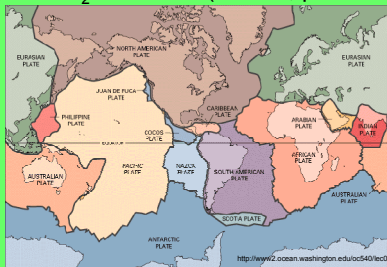
computer demo



1. Set up "test" using Respondus or the Blackboard test feature.
2. Warm-up question set to appear after last assignment and disappear 2 hours before class.
3. Examine all responses to a question. Give credit for complete responses.
4. Follow up on questions and feedback in class.^{1,2}

Selected Warm-up Questions

- If a young relative of yours came to you and asked, "What's science?" how would you respond?
- The reading discusses the difference between weather and climate. Describe an example of a weather phenomenon and compare it to something you consider to be a part of the climate. What's the difference?
- Today's reading includes descriptions of a) the feedback loop involving snow and ice, albedo, and temperature and b) the snowball Earth hypothesis. How does this feedback loop support the idea that Earth's surface might have been completely frozen at some point in the past?
- This question requires you to take a "field trip" to the bathroom. I expect you to be scientifically honest for this question- the "correct" answer is what you actually observe, not what you think the right answer is supposed to be.
Go flush a toilet! Which way does your toilet flush- clockwise or counterclockwise? Do you think the Coriolis effect influences the way water drains out of the toilet, sink or bathtub? Why or why not?
- What is the difference between a tectonic plate and a continent? (Hint: Do the boundaries of tectonic plates always fall along the edges of the continents?)
- The Earth is the farthest away from the Sun on July 4 in its present orbital configuration. Why does the Northern Hemisphere have our summer when we are the greatest distance from the Sun?
- Pick one of these carbon emissions calculators (or find your own) and figure out how much CO₂ you emit each year:
http://www.epa.gov/climatechange/emissions/ind_calculator.html
<http://www.carbonfootprint.com/USA/calculator.html>
How much CO₂ do you emit each year? What is the largest contribution to your CO₂ emissions (like car, plane travel, heating, etc.)



Responses

Go flush a toilet! Which way does your toilet flush- clockwise or counterclockwise? Do you think the Coriolis effect influences the way water drains out of the toilet, sink or bathtub? Why or why not?

The direction that my toilet flushed was counter-clockwise. However, I don't think that the Coriolis Effect has any impact on how water drains, because the force is too tiny to effect this rotation. It seems like the water direction would more likely be influenced by the geometry of the bathtub/sink/toilet bowl and the original direction of the water. I think you would be able to find both clockwise and counter-clockwise flowing drains no matter what hemisphere you were located in.

The toilet flushes clockwise. I do not think that the Coriolis effect influences the way water drains out of the toilet because most toilets flush in one direction because of the the toilet water flows into the bowl at an angle. If water shot into the toilet from the opposite direction it would cause the water to spin in the opposite direction.

My toilet flushes clockwise. I do believe that the Coriolis effect influences the way water drains out of the toilet, sink or bathtub, because of the deflection of the water against the water surface creates the deflection of high pressure from above. And because of the fact that there is no strong wind or force coming in as low pressure once the sink, bathtub or toilet, it creates only clockwise spin, unlike a hurricane.

When I flush the toilet the water goes counter-clockwise. And I have always heard, myth or not, that the toilets in Australia flush the opposite way. And by sucking the water out of the toilet, it creates a low pressure system in the toilet, being influenced by the Coriolis effect.

Issues

- Grading 100's of responses individually before every lecture takes too long.
- Students need to be reminded of purpose of Warm-Ups at beginning of course and mid-course.
- Students more likely to remember to do Warm-ups if assigned on a regular basis (i.e., before every lecture).

References

1. Novak, G.M., Patterson, E.T., Gavrin, A.D., Christian, W. (1999) *Just-in-time teaching: blending active learning with web technology*. Prentice Hall, 188 p.
2. A Just-in-Time Teaching Sampler: <http://134.68.135.1/jitt/jitturls.html>
3. The JTTDL Wiki: http://134.68.135.1/jittdl/wiki/index.php/Main_Page
4. SERC website on JITT, including link to example questions for Earth Science: <http://serc.carleton.edu/sp/library/justintime/index.html>