



SAN DIEGO STATE
UNIVERSITY
Course Design Institute

2008 Course Design Report
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DESCRIBE INSTRUCTIONAL INTERVENTION AND/OR INNOVATION

Describe the innovation so as to contextualize the instructional change: A major progress bottleneck for a number of OCEAN100 laboratory investigations was the logistical necessity for all students to complete the first “front-end” section of laboratory investigations prior to moving on as a group to more hands-on experimentation. Since these “front-end sections” typically involved exploring global data sets, calculating magnitudes and rates, etc. (i.e., they neither required nor involved explicit experimentation), I have been transforming these sections into new distance-learning asynchronous learning modules termed “Pre-Laboratory Explorations” (see table). In addition, for other laboratory investigations, I have been developing new distance-learning asynchronous learning modules as “Post-Laboratory Extensions” (see table). These “back-end sections” are built around pre-existing or new web-based simulations that illuminate the fundamental dynamics of various oceanographic principles.

This ongoing hybridization process is designed to facilitate deeper self-paced learning, provide frequent formative concept-checks (versus a single summative grade), capitalize upon technology as a learning lever, and promote the development and assessment of broadly distributable web-based learning modules. A pragmatic outcome of this hybridization, once completed (see table) will be the ability to decrease formal face-to-face OCEAN100 laboratory time by ~1/3rd (i.e., from 2:40 to 1:50). Thus, formal face-to-face laboratory time will focus on hands-on inquiry-based experimentation as students will either (1) arrive familiar with the fundamental oceanographic patterns related to the given investigation or (2) depart prepared to generalize/extend this experience through an individual web-based modeling experience.

Pre-Laboratory Exploration	Laboratory Investigation	Post-Laboratory Extension
	1. Orientation/investigation	Targeted F09
	2. Plate Tectonics	Targeted F09
	3. Global Bathymetry and Isostasy	Implemented S09
Targeted F09	4. Seawater Properties	
Implemented S09	5. Surface Ocean Circulation	
Implemented S09	6. Deep Ocean Circulation	
	7. Nutrients and Productivity	Implemented S09
	8. Ecosystems I	Implemented S09
	9. Ecosystems II	Implemented S09
Targeted F09	10. Marine Sediments	
	11. Waves	Targeted F09
	12. Tides	Targeted F09
Targeted F09	13. Coastal Issues	

Describe how the innovation related to learning objectives in the course(s): Each laboratory investigation has two to three learning objectives that parallel those in the lecture portion of the course. Below I describe how one “pre-laboratory exploration” and one “post-laboratory extension” relate to their respective learning objectives. These laboratory investigations as well as printouts of the web-based content are attached.

Investigation 4: Surface Circulation – The primary focus of the “pre-laboratory exploration” for this investigation is the guided identification and description of fundamental spatiotemporal variations in global ocean temperature and salinity using color-coded “map views” during different seasons and at different water depths. Exploration and documentation of these fundamental patterns prepares students to move towards a process-focused approach during the face-to-face laboratory time. Note that the students are required to “take a stab” at some potential processes prior to attending laboratory, but these attempts are very low stakes and are then revisited and revised through TA-mentored group discussions during the laboratory.

Investigation 2: Isostasy and Bathymetry – The concept of isostasy explains the major patterns in our planet’s surface elevations (e.g., mountains, continents, ocean basins) as a function of the local density and thickness of the underlying compositional layers. Thus, the primary goal of the “post-laboratory extension” for this investigation is to promote a shift in students’ understanding of isostasy from a relatively passive acceptance based on “plug-and-chug” calculations towards a more dynamic mathematical understanding based on a hands-on web-based simulation developed in collaboration with Dr. Gary Girty. In the simulation, the student can actively vary the thickness and density of multiple layers within each of five adjacent columns in a generalized cross-section of the upper layers of the Earth, and these student-input variation results in different surface elevations for each column relative to sea level.

DESCRIBE YOUR ASSESSMENT “METHOD”

Briefly describe the assessment ‘methodology’ (i.e., pre-post, change, criterion-based, etc.) and/or ‘instrument’ (i.e., survey, media products, etc.): My first iteration during the Fall 2009 semester largely focused on the transformation of content from a synchronous face-to-face format to an asynchronous distance format. This first iteration was field-tested through a “simulated” distance-learning format where students completed the learning module in small groups using laptop clusters during the formal laboratory time. Informal feedback from students and TAs led to substantial refinements in content and delivery. To move towards a more formal assessment approach, I am currently developing pre-post assessments via Blackboard that target the specific learning outcomes for each asynchronous learning module, where the completion of the pre-assessment triggers an adaptive release of access to the learning module.

DESCRIBE RESULTS OF YOUR ASSESSMENT

Describe the process by which assessment/evaluation of intervention/innovation was conducted: To date, assessment and evaluation has been largely informal through implicit feedback from student performance or explicit feedback from encouraged student comments/suggestions for improvement. As mentioned above, I am now implementing a more formal assessment approach through Blackboard-based pre-post assessments that target the

specific learning outcomes for each asynchronous learning module, where the completion of the pre-assessment triggers an adaptive release of access to the learning module. In addition, I anticipate addressing issues related to TA-effects through planned discussions with Marcie Bober (SDSU College of Education; see below).

Describe key results or findings of assessment/evaluation process: A key finding is that some students have a difficult time successfully completing such distance-learning modules even when working face-to-face in small student groups within lab. Thus, once I move to a more formalized and required asynchronous format, I envision also providing prescheduled Wimba sessions to facilitate understanding for self-selected students that would benefit from additional assistance.

IDENTIFY IMPLICATIONS OF ASSESSMENT

Identify what changes that assessment/evaluation process imply for changes or revisions to the course(s): Given that I will be on sabbatical for the Fall 09 semester and that the university did not provide related funds for the hiring of my preferred lecturer, I will likely focus on continuing to explore assessment issues for implementation during the Spring 10 semester when I return to teaching the course. Thus, I envision not formally shortening the laboratory face-to-face time until Fall 10 semester to provide additional breathing room for improvements and interventions during the Spring 10 semester.

Articulate specific plans for next stage revisions: The efforts of this course redesign are now being leveraged into the development of a NSF Course Curriculum and Laboratory Improvement proposal for submission in May 2009. This proposal will include a detailed and integrated assessment component through collaboration with Marcie Bober (SDSU College of Education) as well as additional content through collaboration with Terri Larsen (SDSU Computer Sciences) and Gary Girty (SDSU Geological Sciences).

Articulate specific challenges and opportunities to help us and your department understand how to help you proceed with the next iteration of your project: Nothing specific, except to highlight to the administration that such course redesigns, if done thoughtfully and effectively, are incredibly time-intensive and challenging to pursue under the every accelerating “doing more with less” fiscal regime.