Larry L. Sautter Award for Innovation in Information Technology - 2016

Project Leader: Keith C. Clarke (Professor of Geography, UCSB). Other UCSB team members: Bo Romero, Jorge Chen, Kitty Currier, Blake Regalia (Geography Graduate Students). Guylene Gadal (Software Development Coordinator Geography, UCSB), Kim DeBacco (Instructional Development, UCSB), Ava Arndt (Instructional Designer, University of California Office of the President).

Creation of Online Class GEOGW12: Maps and Spatial Reasoning

Maps and Spatial Reasoning is a class taught at UCSB since at least 1998. When the original call for proposals from the UC Online Pilot program came out, this course was selected for online conversion because it was freshman level, science credit class with high enrollment. The conversion began in 2011, when a set of modules were designed. The original vision was to have a creative user interface, based on a puzzle-version of a world map that students completed by working their way through the class material. This online experience was to replace the class lectures, with face-to-face labs surviving the transition. Over the next year, the user interface was coded by Blake Regalia. Kitty Currier worked with Keith Clarke to create the quizzes, video, text, slides and audio that make up the class modules.

Particular innovations that were placed into the class were: (1) a game-like map user interface called the Portal; (2) Place-linked course segments, where real places were used to reinforce memory of key class concepts, a method we call place-based learning; and (3) low risk assessment, in which students who answer quiz questions wrong are directed back into the content to where the idea was taught, then allowed to retake the quiz; and (4) explicit teaching of spatial thinking as a means of scientific reasoning.

Students have responded well to these elements. Once the class was complete, it was tested in the Fall quarter of 2012. Two UC-based advisors (Ava Arndt at UCLA and Kim DeBacco at UCSB) provided feedback on the class, and students were encouraged to submit emails discussing how the class could be improved. As a result, many changes in length and content were made and the class was (and continues to be) improved. Two other major additions have been made to the class. First, after a three year effort, the online eText “Maps and Web Mapping” was published by Pearson. This book is closely coordinated with the class, with chapters coinciding with modules, but includes a large amount of additional online material such as tutorials, quizzes, news feeds, web links to maps, and additional references. The book was published in 2015, and is required by students in the class. The second addition is the creation of a UC-wide version of the class through UC Online. While this might seem a simple change, in fact the course management system Moodle (Gauchospace) used in for the labs in the UCSB version has to be completely restructured using the open source software Canvas. While the Portal could still be used for the modules, the labs were completely rebuilt in Canvas. Jorge Chen wrote and tested the original labs, including innovative coding in Flash and other improvements. Bo Romero coordinated the initial offering of the fully online version, while Guylene Gadal handled the server traffic and issues. Ava Arndt and Kim DeBacco provided excellent feedback that made the labs more student friendly. The class is now offered each Fall, with enrollment of about 100 students, and during the Spring and Summer quarters. ESCI scores are very good, and students provide excellent written and email feedback. The fully online class offers ample opportunity to measure student progress, so we find that the role of the instructor is more as a personal advisor and coach, rather than a remote podium lecturer.
The class was a direct response to the UC President’s call for high impact online content that would take advantage of the strengths of the various UC campuses. We feel that it meets the need for providing a creative but thorough introduction to the science of cartography, and that this serves as an excellent start for more Geography or other STEM classes. The class teaching about map projections, coordinate systems, geodesy, land partitioning, online mapping, topographic and other types of maps, cartometry (map measurement), navigation and GPS, geobrowsing with tools such as the National Map Viewer and Google Maps, and spatial thinking. It includes video from Ankara and Catalhoyuk, Turkey, from the Royal Observatory in Greenwich, London and from East Liverpool, Ohio, birthplace of the Township and Range system. Students get experience navigating with map and compass, and with outdoor use of GPS receivers. In the fully online version, this was filmed using Google Glass so that students could see what the instructor was looking at while navigation and reading a compass. As the cross-campus enrollment grows, we anticipate that the class will be a model for shared curriculum and resources within the UC system, and a broad positive change in the University environment. It is an example of embracing new learning technologies, but in a very UC-specific way.

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The portal: https://anteater.geog.ucsb.edu/geog/portal/ (login guest, password tseug)
The eText: http://wps.prenhall.com/wps/media/access/Pearson_Default/15561/15934632/login.html (Instructors can register for free access)
UC Online version: https://cole2.uconline.edu/courses/404451 (needs UC Passport login)
UC Online Enrollment page with promotional video: http://www.uconline.edu/courses/geog-12/

Figure 1: The GEOGW12 class Portal, shown when the class is complete. Each puzzle piece (and stage of the world tour in red) opens one of the modules, controlled by the icons at the bottom. Completion of a module “earns” the module icon as a “badge”, which gives open access to the completed content.
Figure 2: The user interface for Module 10: “Where am I?” The syllabus is the list of questions at the left, which can be used to navigate content. At right is a notepad, where students can retain notes on any section for permanent storage. The introductory video uses a place (in this place the Coal Oil Point Continuously Operating Receiver Station, part of the National Geodetic Reference Framework) to give the idea of positioning a locational face. All class video is served from YouTube, and includes captioning, which is very much favored by non-native English speaking students. Students can replay content as many times as they wish, and must complete quizzes at the end of modules, but are not graded on them and can retake the quiz at will.

Figure 3: An example of a quiz. Clicking “Submit” shows right and wrong answers. The blue buttons take the student back to where in the module the question was answered, thus reinforcing and correcting rather than punishing an incorrect response.
Figure 4: The course entry point in Canvas using the UC Online version.

Figure 5: One of the Online labs, shown introducing the compass by use of an interactive virtual compass, programmed in Flash.
Page 473 in Chapter 24 of the etext. Note that highlighted key terms can be clicked to get the glossary entry, that clicking on a Figure reference creates an enlargement of the graphic, and clicking on the orange coordinate reference launches (in this case) the National Map viewer to take you virtually to the actual location.