Agroecology has a history of experiential participatory learning focused around wicked problems (Warner 2008). The notion of wicked problems encapsulates problems that are poorly defined, context dependent, escape disciplinary solutions, and do not have answers that are right or wrong, only better or worse (Rittel and Webber 1973). These wicked problems surround us from feeding nine billion plus people to deforestation and hypoxic zones. They span across spatial scales, countries and cultures. Agroecology as a field has engaged wicked problems in agricultural systems through participatory engagement and experiential learning (Francis et al. 2012). Future agroecologists need a complex set of skills including, but not limited to, reflectiveness, intercultural capacity and the ability to work with technology across disciplines and data types (CFANS 2009). Note that intercultural capacity is much more than working across geopolitical or racial boundaries, but is a skill necessary to work between urban and rural contexts or between groups that adhere to different ideologies. In addition, budgets at universities are shrinking (Dalton 2009), yet greater educational outcomes are required for undergraduate preparation (CFANS 2009). In response to these pressing needs, a new model of online international education has been developed, and aspects of it are being tested in a new class titled *Agroecosystems of the World* (CFANS3480). We hypothesize that 1) the *Extended Classroom* model will effectively instruct undergraduate students in the process of agroecological inquiry, 2) the process of using open-ended cases in online social networks will cause students to positively shift in their intercultural competency, 3) the process of considering agroecosystems as coupled human-environmental systems will cause students to positively shift in their environmental disposition, and 4) from the students’ perspective, online geographic information systems (GIS) are effective tools for communicating and increasing comprehension of interdisciplinary data.

The first step of tackling student preparation in the face of wicked problems was developing a new framework for online experiential learning that integrated the above listed skills. Doering (2006) developed a framework for working in online and hybrid learning environments oriented toward learning from field scientists called *Adventure learning* (AL). AL is deeply rooted in experiential learning (Dewey 1897) as well as being inquiry-driven (Doering 2006). However, it lacks emphasis on the integration of other stakeholders surrounding an “Issue and Place”. Similarly, Latour (1999) presents a model to think about science in society called the *Circulatory System of Science*. This framework encompasses many stakeholders (farmers, industry, scientists, nature, and the public) centered on “Content”, but lacks the structure needed to engage students in an online experiential learning process. In combining and adapting these two frameworks, we find a model for online experiential learning called the *Extended Classroom*. In the *Extended Classroom* model, students are portrayed as equal stakeholders along side of those listed in Latour’s model, yet the more rigorous online educational aspects of *AL* are present as well. In combining the models, the spirit of each is still present; however, they are uniquely adapted to prepare students to face wicked problems within agricultural systems.

As a proof of concept for the *Extended Classroom* framework, we designed a course titled *Agroecosystems of the World* (CFANS3480). We began by identifying four international locations based on the criteria of ecoregion uniqueness and existing strength of connection to the University of Minnesota. After establishing connections in Cottonwood County, Minnesota, EARTH University, Costa Rica, Meknes, Morocco, and the Biodiversity Conservation Center, Nepal, we utilized stakeholder knowledge to collaboratively compile course resources for each agroecosystem. Utilizing a plethora of
online tools ranging from Ning for social networking and course management to Google Maps (javascript api v3) and ArcGIS Online, an online environment was developed to capture and hold the data and experiences of our students and collaborators. The students began the course by engaging with frameworks of agroecosystem analysis. These ranged from ecosystem services and tradeoffs assessment (Power 2010) to social capital assessments (Flora 2001). These frameworks were then applied as we virtually toured each region with the guidance of our on-the-ground collaborator. As of October 29th, 2012, we are exploring Costa Rica. As the semester has progressed, instruction has gone from more rigid to less rigid allowing for increased student-directed inquiry. The semester will end with students guiding the class through a specific wicked problem in one of our four locations.

To capture the impacts of the course, we chose a prospective case study design (Bitektine 2007). We have administered pretests and will administer posttests to students of the Intercultural Development Inventory (IDI) and the New Ecological Paradigm (NEP) survey. In addition, we will collect reflective journals for qualitative evidence. The reflective journals will help give deeper meaning to the individual score changes. To analyze the results, we will use both the internal metrics established in the IDI and NEP as well as perform an analysis of variance and paired t-tests. The qualitative reflective journals will be analyzed using NVivo, a computer-based coding program that searches for themes based on training samples. The goal is not to test every aspect of the model, nor are we attempting to generalize to all educational contexts. We are simply trying to capture and comprehend the effectiveness of online geographic information systems and the impact of the process on students’ intercultural capacity and environmental dispositions.

For future work, it will be necessary to expand the number of stakeholders involved as well as include them more directly in the hypothesis formation process. A controlled case study design should be used as well to allow for generalization beyond the individual classroom. It’s imperative that we develop educational models that allow for and encourage the dynamic thinkers of the future. The scientists of today are working hard to solve the problems of today, however, given the great complexity of the problems we face, it is likely that solutions will come from their students as they take up the primary responsibility of the future.

**Resources**


http://www.cfans.umn.edu/prod/groups/cfans/@pub/@cfans/documents/asset/cfans_asset_143155.pdf


doi:10.1080/01587910600789571


