Agroecology Education by Bicycle on Two Continents: Student Perceptions and Instructor Reflections

Paul M. Porter,* Bryan C. Runck, Mary P. Brakke, and Margaret Wagner

ABSTRACT Given that much of the learning about international agroecology would ideally occur outside the classroom, adventure learning (AL) and systems action education (SAE) can offer synergistic approaches that synthesize these methodologies into a cohesive student learning experience. This article reports on the evolution of a series of international agroecology courses offered from 2009 to 2011 that progressively integrated AL and SAE approaches in course design. The courses were taught by a University of Minnesota professor as he bicycled across Africa (2009 and 2010) and South America (2011), exploring various landscapes, crops, climatic regions, and food systems with students back home via distance technologies. End-of-course survey responses indicated that students (1) did not find the course any more rigorous than similar level courses, (2) found the course much more unique \( p < 0.01 \), and (3) increased their desire to travel abroad \( p < 0.01 \). Our examination also revealed challenges and opportunities inherent with AL and SAE–merged classrooms. Overall, we found that AL and SAE approaches could be integrated to enhance agroecology education and can make courses inspiring, challenging, and rewarding. The result could have implications for schools that seek to prepare students to work in a global environment.

Adventure learning (AL) and systems action education (SAE) are education models that seek to bring authenticity to learning environments by facilitating learners’ interactions with real-world systems and problems. To date, there have been few explorations of AL in a small-scale context (i.e., a small class size and low budget context) (Veletsianos and Kleanthous, 2009; Veletsianos, 2010), and none have explored food systems education. Adventure learning is “a hybrid distance education approach that provides students with opportunities to explore real-world issues through authentic learning experiences within collaborative learning environments” (Doering, 2006). Adventure learning emerged in the 2000s as a way to allow students to connect to complex global issues such as climate change in an experiential way via online technologies where an adventurer serves as students’ guide. The goal was to connect students to issues by bringing them to real places through distance technologies, engaging more of their senses, and thus making learning more impactful. Systems action education emerged from the realm of food systems education “as a method to inform the design of curricula” that “assist(s) learners in gaining special orientation and practical capabilities that appear crucial to management, stewardship, and sustainable development of agriculture” (Francis et al., 2012). Although SAE has been implemented in an online context, it currently lacks the explicit instructional design framework that AL offers. This article reports on a small-scale project involving University of Minnesota (U of M) students and faculty that evolved to integrate strengths of both educational approaches. Each successive year, from 2009 to 2011, the teaching and learning experiences incorporated the AL (Doering, 2006) and then the SAE (Francis et al., 2012) approaches more comprehensively.

In 2009, 2010, and 2011, a series of courses focusing on international food systems was offered through the Department of Agronomy and Plant Genetics at the U of M (Francis et al., 2011). Dr. Paul Porter, a professor in the College of Food, Agricultural and Natural Resource Sciences, bicycled across Africa in the spring semesters of 2009 and 2010, and across South America in the fall semester of 2011. During his travels, he remotely taught U of M undergraduate students enrolled in AGRO3480 (“Food and Agriculture from Cairo to Cape Town at 10 mph” in 2009 and 2011, and “Food and Agriculture from Buenos Aires to Lima at 10 mph” in 2011). In 2009 and 2011, he received support from two teaching assistants (Margaret Wagner and Bryan Runck, respectively), and in 2010 and 2011 he co-taught with Dr. Mary Brakke, an instructor who remained in the classroom on campus. Course materials and daily updates were available online to students and to the general public. Additionally in 2011, Runck developed a K–12 curriculum that was made available online. Also during that course, three U of M undergraduates and one graduate student accompanied Dr. Porter, or, for our purposes, the “adventurer,” on the ride.

Abbreviations: AL, adventure learning; CMS, content management system; SAE, systems action education; U of M, University of Minnesota.
Background: Adventure Learning and Systems Action Education

Adventure learning, pioneered by Aaron Doering of the U of M through his “Go North!” Projects in the 2000’s, inspired millions of learners globally as he doglegged across the Arctic exploring environmental issues through a multidisciplinary lens focused on problem solving (Doering, 2005, 2006; Doering et al., 2008). His work inspired students through the narrative of an adventurer as he explained the Arctic ecosystem, climate change research, and indigenous peoples’ cultures. Although Doering’s efforts were overwhelmingly successful, critics of AL have stated that the large scale and high cost makes the approach elite and exclusive (Veletsianos, 2010). In response, the AL framework evolved to become more inclusive of small scale and even low-technology style projects (The Learning Technologies Collaborative, University of Minnesota, 2010). In their review of AL literature, Veletsianos and Kleanthous (2009) specified AL as an “approach [authors’ italics] for designing teaching and learning environments, whether those are online or hybrid, or used in face-to-face or distance education contexts.” The approach has evolved to encompass multiple project scales; however, it still remains grounded in experiential (Dewey and Small, 1897) and inquiry-based (Kolb, 1984) theory, where students are the center of the classroom experience. The goals of AL have also remained the same: authentic, context-specific education. Ultimately, the AL approach is flexible and able to be applied across disciplines and educational objectives. In our case, it offered a novel model for exploring agroecological inquiry online while remaining directly concerned with a specific place—the place that is the target of the “adventure.”

“Adventure learning” has many different meanings within the academic literature and is similar in many respects to other work done within the computer-assisted learning literature. Some projects that do not claim the “adventure learning” title could be considered synonymous with AL (Veletsianos and Kleanthous, 2009) such as virtual/electronic fieldtrips (Jacobson et al., 2009) and online expeditions (Rasmussen and Northrup, 1999). Other work called adventure education doesn’t involve any online aspects, but involves bringing students into adventurous situations (Hattie et al., 1997). As noted by Veletsianos and Kleanthous (2009), the main similarity between these approaches is adventure, but they differ in that some are projects, whereas others are models for designing online and hybrid education environments. Similarly, other models of computer-assisted learning have emphasized the importance of merging the design process with content in computer-assisted learning environments (Edelson, 2001), and using problems and discovery processes as means to drive the learning process (De Jong and Van Joolingen, 1998; Hmelo-Silver, 2004). Our approach draws specifically on the conceptual frameworks of Doering (2006) and The Learning Technologies Collaborative, University of Minnesota (2010), which rely on aspects of all of the previously listed theories. We additionally rely on systems action education theory (Francis et al., 2012).

There are many synergies between AL’s and SAE’s theoretical foundations. In a recent publication, Francis et al. (2012) reviewed the agroecology education literature, presented a cohesive picture of the current theoretical thought within SAE regarding agroecological education, and laid out a path for the future of agroecological education. While informed by similar constructivists such as Dewey and Small (1897) and Kolb (1984), SAE also has theoretical roots in Freire (1973) and Hahn (Carver, 1997). Freire and Hahn offer two educational approaches, both tied to empowering learners through authentic, capacity-building experiences. Francis et al. (2012) also articulated the importance of studying agroecosystems both “systemically” and “systematically.” In other words, agroecological education should offer opportunities for students to shift back and forth between considering the individual elements of a system (systematic study) and the interconnected nature of these elements (systemic study). Although AL does not overtly emphasize empowerment or systemic and systemic study, these ideas are not inherently antagonistic to AL’s goals. Adventure learning, as stated above, also falls within the constructivist philosophical camp and adheres to a similar intellectual lineage. So while some fundamental differences in focus exist between SAE and AL, these differences actually enhance areas currently overlooked in each model.

Agroecology has been primarily defined as a “systems thinking” and “trans-disciplinary” field concerned with “wicked” problems, or problems that elude disciplinary, single-solution answers (Francis et al., 2003, 2012; Wezel et al., 2009). Because of the field’s orientation toward applied knowledge, agroecological educational theory focuses on “capacity building” within real-world contexts that prepare students with the intellectual and practical skills to address wicked problems (Francis et al., 2011).

Adventure learning has similar concerns in terms of building student capacities (Doering, 2005). For a fuller comparison of SAE and AL, see Table 1.

Research Goals

In light of the synergies between SAE and AL, the U of M courses (AGRO3480: “Food and Agriculture from Cairo to Cape Town at 10 mph” and “Food and Agriculture from Buenos Aires to Lima at 10 mph”) evolved to more fully incorporate the constructivist and student-centered nature of both approaches. End-of-course surveys enabled the teaching team to retrospectively characterize the impact of each approach. We wanted to document whether combining AL and SAE could be an effective pedagogy for agroecology instruction by analyzing students’ end-of-course, open-ended survey responses. We sought to test the combined effectiveness of AL and SAE in the following ways:

1. We wanted to document the rationale surrounding the shifting use of AL and SAE, and the resulting technological shifts, from the instructors’ perspectives.
2. Because of the evolving nature of the courses’ use of AL and SAE, we wanted to compare the shifts from 2009 to 2011 in student perceptions of the learning experiences’ rigor and uniqueness. We hypothesized that the course would be perceived as more rigorous and unique in 2011 because of the fuller integration of the two theories.
3. Because of the heavy dependence on digital communication technologies, we wanted to compare students’ perceived effectiveness of different content management systems (CMS), Ning and WordPress/WebVista, and use that information to inform future decision-making about CMS selection within AL and SAE classrooms.
4. Because much of the interaction with the adventurer occurred via distance technologies, we wanted to document the impact of altering the course pedagogy from
2010 to 2011 on students’ perceptions of the adventurer by coding short-answer survey responses.

5. The U of M’s College of Food, Agricultural and Natural Resource Sciences has become increasingly aware of the need to develop interculturally competent learners for work in a globalized economy. Because the instructors believed in the value of international experiences for undergraduates, we wanted to explore whether such a course would increase students’ desire to travel abroad and engage in cross-cultural learning experiences.

MATERIALS AND METHODS
Rationale for Combining Use of AL and SAE

When designing the three separate course iterations, aspects of AL and SAE were integrated at different levels. The general progression, however, was from teacher-centered to student-centered. For each course, the process began by selecting an issue and a place to anchor instruction. In 2009 and 2010 it was 10 African countries; in 2011 it was 4 South American countries (Fig.1). The main issues to be explored in all three courses were how humans alter their natural environments through agriculture, and how the natural environment influences human agricultural activity. These issues, while broad, were grounded in a specific set of topics for each country. These came about after reviewing relevant literature, then finding supporting multimedia and guest lecturers, typically from within the U of M, who had expertise on the given subject, including politics, history, crop production, and so forth. For example, in 2011, on the Argentina leg of the trip, the class studied changes in land use—how soybean production caused conflict through high exports taxes on soybean, and the move in Argentinian beef production to feedlot finishing. During this segment, students engaged in discussion exploring how global markets influenced land use change in Argentina, and how this land use change intersected with long-standing cultural traditions. To help students engage with the Pampas and the related issues, Dr. Porter called into class and discussed with students from the road to describe what he saw, and how what he saw connected to these broader national and international economic and cultural movements. Dr. Porter posted pictures of the Argentine landscape and different agricultural practices with detailed descriptions of each photograph. These photographs supported the weekly written blog posts and daily audio blog posts that Dr. Porter was posting online. Here is where the AL framework drives home the exploration of issue and place. It identifies the need for an authentic narrative, which was initiated by observations supplied by a professor biking through the farms, fields, and markets of an ecosystem and investigated further by students during discussions and in-class presentations.

Course design called for students on the U of M’s St. Paul campus to follow the adventurer (Dr. Porter) as he bicycled across Africa (spring 2009 and spring 2010) or South America (fall 2011) (Fig. 1). During 2009, Dr. Porter spent half a semester teaching the course remotely before leaving Africa due to a bicycling injury. This presented an opportunity for the him to return to Africa the following year to resume the ride and conduct a second Africa course, in spring 2010. Thus, in 2009 and 2010, Dr. Porter was in the St. Paul classroom for half the semester and adventuring for the remainder. For the 2011 class in South America, he was in the field the entire semester, except for the first week, which was spent in the classroom.

Each ride coincided with the U of M’s semester schedule (Table S1). All three rides were organized by Tour d’Afrique (www.tourdafrique.com), which specializes in facilitating bicycle riders’ travel on long-distance expeditions. On average, the adventurer bicycled approximately 100 km per day (Tables S1 and S2). For the African courses, he traveled with about 50 other riders on a relatively fixed route through 10 countries (Fig. 1; Table S3). In South America, he traveled with about 20 riders (including 4 U of M students) through 4 countries (Fig. 1; Table S3). Tour d’Afrique supplied the riders’ gear and provided local food on most ride days. In all three courses, there was a co-teacher and/or teaching assistant back in St. Paul delivering course content, coordinating logistics, organizing guest speakers, and managing the technology. Managing the technology consisted of constructing an online environment where students could pursue individualized investigation and consideration of agroecological issues that were identified by the adventurer.

Following the adventurer as he traveled cross-continent by bicycle and delivering high-quality instruction was complex. It required a variety of technologies, backup plans for backup plans, a well-informed and flexible base of support, and a willingness to be patient. In each successive year, adjustments were made to improve course delivery from a technical, logistical perspective. The goal was to design a learning environment in which students could utilize the adventure to pursue agroecological inquiry. As shown in Fig. 2 and Table 2, we continually tested and changed...
Fig. 1. Map illustrates routes of adventurer’s bicycle trips across Northern Africa (2009), Southern Africa (2010), and South America (2011). Map created using ArcGIS 10.2 (ESRI 2013).

Fig. 2. Technology used to deliver courses in 2009, 2010, and 2011.
Table 2. Agroecology education adventure learning project evolution from 2009 through 2011.

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geography explored</strong></td>
<td>Northern Africa</td>
<td>Southern Africa</td>
<td>South America</td>
</tr>
<tr>
<td><strong>Theory of practice</strong></td>
<td>Adventure learning</td>
<td>Adventure learning</td>
<td>Adventure learning and systems action education</td>
</tr>
<tr>
<td><strong>Key learning activities</strong></td>
<td>In-class guest lectures, crop reports, cultural experience, midterm exam, final exam</td>
<td>In-class guest lectures, crop reports, cultural experience, midterm exam, final exam</td>
<td>In-class guest lectures, crop reports, cultural experience, student-led discussions, midterm exam, final exam</td>
</tr>
<tr>
<td><strong>Adventure communication</strong></td>
<td>Daily audio blogs, weekly images with captions, weekly live conversation with U-Grad students in class</td>
<td>Daily audio blogs, weekly images with captions, weekly live conversations with U-Grad students in class</td>
<td>Daily audio blogs, weekly images with captions, weekly videos, weekly written blog, weekly live conversations with U-Grad students in class</td>
</tr>
<tr>
<td><strong>Content management system</strong></td>
<td>WebVista WordPress (WP)</td>
<td>WebVista WP</td>
<td>Ning</td>
</tr>
<tr>
<td><strong>Image storage/delivery</strong></td>
<td>WP</td>
<td>WP</td>
<td>Ning</td>
</tr>
<tr>
<td><strong>Video storage/delivery</strong></td>
<td>Google Maps</td>
<td>Google Maps</td>
<td>Vimeo</td>
</tr>
<tr>
<td><strong>Other multimedia</strong></td>
<td>-</td>
<td>-</td>
<td>Google Maps</td>
</tr>
<tr>
<td><strong>Online discussion system</strong></td>
<td>WebVista</td>
<td>WebVista</td>
<td>Ning</td>
</tr>
<tr>
<td><strong>Online grading system</strong></td>
<td>Satellite phone, IBM laptop, email at Internet cafés</td>
<td>Satellite phone, IBM laptop, email at Internet cafés</td>
<td>Moodle</td>
</tr>
<tr>
<td><strong>Communication technologies</strong></td>
<td>-</td>
<td>-</td>
<td>Satellite phone, Mac laptop, email at Internet cafés</td>
</tr>
<tr>
<td><strong>No. of people involved in course delivery</strong></td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Adventurer time in classroom</strong></td>
<td>Half a semester</td>
<td>Half a semester</td>
<td>A few class periods at end and beginning of semester</td>
</tr>
<tr>
<td><strong>Primary form of instruction</strong></td>
<td>Face to face; twice per week for 75 minutes with teaching assistant Margaret Wagner</td>
<td>Face to face; once per week for 180 minutes with Dr. Mary Brakke</td>
<td>Face to face; once per week with Mary Brakke and teaching assistant Bryan Runck</td>
</tr>
</tbody>
</table>
thing. But then, instead of only hearing guest lecturers, students would lead class discussions on a topic related to a specific location on the bicycle ride. In small groups, students identified questions related to a topic of interest, then led class discussion. The activity enabled students to conduct their own inquiry based on questions related to observations provided by the adventurer or concepts presented by guest speakers. To round out course requirements, students were responsible for: (1) required readings posted to the CMS; (2) writing a report on a marginal crop (in 2011 they had to specify how the crop could be utilized to increase food security); and (3) finding a cultural experience related to the countries where the adventurer was traveling, such as eating at an authentic restaurant or attending a cultural event on campus or in the community. Students were then required to reflect on this experience and how it contributed to their understanding of the issues and places being explored in the course. The course also included a midterm and final exam that tested students' knowledge of course content as presented online and in the classroom.

The transition in instructional activity design from 2009 and 2010 to 2011 reflected the further expansion of the instructors’ orientation toward not only the process associated with AL, where an adventurer tells a compelling educational story, but also toward the constructivist, student-centered nature of AL and SAE (Jordan et al., 2008; Francis et al., 2012). Systems action education particularly informed the design of the student-led discussions in 2011 that empowered students to explore the issues and places on their own terms (Table 2). Additionally, SAE was instrumental in informing the development of the cultural experience assignment, which required students to activate their learning in the unique cultural contexts within the greater St. Paul and Minneapolis area. The 2011 assignments were particularly designed to guide students in the exploration of various agroecosystems, both the individual components of food systems as well as the interactions of many factors that play out in both local and global context. This assignment, facilitated by multimedia uploaded by the adventurer, encouraged students to consider the details of food systems such as agronomic practices, local soils, and weather patterns (systematic study). It simultaneously encouraged students to consider the connections (systemic study) within the political and cultural systems, such as why food aid was present in countries with seemingly ample food.

Each year, the course was advertised at the university by flier, website, and through brief presentations in other courses. The 3-credit course was offered to any student wishing to take it, although the explicit expectation was that the workload would be most appropriate for an upper-level undergraduate. Additional assignments were required for those enrolled as honors students or graduate students. Total enrollments are summarized in Table S5. The general public was encouraged to follow along on the adventurer’s WordPress website (http://paulporter.cfans.umn.edu) or the Ning website (http://eatbikergrow.ning.com). The adventures and courses also earned a number of articles in the popular press (Couzin 2009; Goulanger 2008; Gold 2011; Raveling 2011).

**Student Surveys**

A total of 79 students were in the three courses (35 in 2009, 20 in 2010 and 24 in 2011). From 2009 to 2011 approximately 63 students (35 in 2009, 16 in 2010, and 9 in 2011) completed a course survey and rated the course and learning experience on a 0 to 10 scale, where 1 = poor, 5 = average, and 10 = great, on the following topics: the course CMS, the adventurer’s audio blog, enhancement of student desire to travel abroad, difficulty of course, uniqueness of course, and adventure’s impact on student decision to take the course. The same survey asked students to rate course materials and activities (audio blogs, crop reports, cultural experience, Google Earth map, weekly quizzes, exams) on a scale of 1 to 4 (excellent, good, inadequate, very poor, and not applicable). In 2010 and 2011 the students were given a course survey designed by the U of M to rate the effectiveness of course instructors, and the course in general. The U of M survey asked students to consider instructor effectiveness and their own effort, and offered space for additional comments. Comments were coded for content and themes by first identifying subthemes at the sentence or sub-sentence level and then aggregating subthemes into larger thematic categories. All content dealing with students’ perceptions of the adventurer were numerically coded based on the comment sentiment on a 10-point scale with 0 = very negative, 5 = neutral, and 10 = very positive. Students were given surveys at the end of the course without the presence of instructors. The response rate was 81% averaged across the 3 years. Pearson’s Chi-Squared and Welch’s t-test statistical tests were performed according to Snedecor and Cochran (1989) and Ruxton (2006), respectively, and were performed in the R Statistical Environment (R Core Team, 2013).

**RESULTS**

**Rigor and Uniqueness**

In 2009 and 2010, the student’s perceptions of course rigor averaged 5.94 and 5.31, with standard deviations of 1.86 and 1.08, respectively. In 2011, the mean response was 5.58, with a standard deviation of 1.44. Across all years, the mean response was 5.71, or roughly average difficulty, with a standard deviation of 1.62 (Table 3). Each year, the courses were designed to be equivalent to courses of similar level and credit; therefore, we would expect an average response of 5. A Pearson’s Chi-Squared Test revealed that the perceived rigor of the courses was not statistically different from the expected value for any of the years. Comparing pre-SAE (2009, 2010) and post-SAE (2011), the Welch’s t-test, which accounts for the unequal sample size and variance, showed no significant difference in perceived course rigor. In other words, students perceived the courses were average in difficulty when compared with similar-credit courses, and across years the course was perceived to be similarly rigorous.

Across all 3 years, students found the course to be extremely unique with a 3-year mean response of 9.17, and a standard deviation of 1.16. In 2009, the mean response was 9.11 in 2010, 9.43 and 9.00 in 2011, with standard deviations of 0.90, 1.09, and 1.81, respectively (Table 3). These results changed inversely with students’ perceptions of courses rigor. A Welch’s t-test revealed no statistically significant difference between years, but the results were statistically significant when compared to an expected response of 5, representing average, using a Pearson’s Chi-Squared Test (p < 0.01).

In 2010 and 2011, the average course activity effectiveness, rated on a 1 to 4 scale, was 3.29 and 3.38, respectively. Coded student survey results between 2010 and 2011 reveal that in 2010, students emphasized their appreciation of the diversity of the guest speakers, but stated a desire for more time for discussion. For example, “I liked all of the speakers we had and felt very lucky to have them.” In 2011, one student mentioned the desire for “more interaction with native peoples to share.”


Effectiveness of CMS

In 2009 (n = 35), the mean response for the perceived effectiveness of the CMS was 6.97, with a standard deviation of 2.12, compared with a mean of 8.50 and a standard deviation of 1.51 for 2010 (n = 16). When combined (n = 51), the perceived effectiveness of the CMS was 7.45, with a standard deviation of 2.19. In 2011 (n = 9), the mean response for the Ning CMS was 5.75, with a standard deviation of 2.62 (Table 3). A Welch’s t-test was used to compare the WordPress/WebVista and Ning. This revealed a difference between students’ perceived effectiveness of the CMSs (p = 0.03) and a preference for WordPress/WebVista.

Additionally, in 2011 only, students were asked to rate the effectiveness of the Ning CMS as a way to follow the bicyclers. The mean response was 7.00, with a standard deviation of 1.65, which would indicate that students perceived the Ning CMS relatively positively as a method to facilitate communication between students and the bicyclers. In contrast, when students were asked to rate the Ning CMS as a means of facilitating student interaction with each other, the mean response was 4.75, with a standard deviation of 1.86, which indicates a slightly negative perception of the 2011 CMS in this regard.

In 2009, 74% of students visited the CMS one to two times per week, 23% visited three to four times per week, and 3% visited five times or more per week. In 2010, 50% of students visited the CMS one to two times per week, 50% visited three to four times per week, and no students visited the CMS five or more times per week. In 2011, 58% of students visited the CMS one to two times per week, and 42% visited three to four times per week. The most common number of visits per week on average over 3 years was one to two times per week, with 65% of students over the 3 years visiting the CMS that often, 33% visiting it three to four times per week, and roughly 1% visiting it more than five times per week. Note that every effort was made to post the audio blogs daily.

Student Perceptions of the Adventurer

A Welch’s t-test of coded student comments revealed that they perceived the adventurer more positively in 2010 than in 2011 (p < 0.01) (Table 3). Specifically, the content of student responses in 2010 centered around the delivery of course content through both the designed course activities, such as invited guest speakers, as well as adventurer interactions via web materials or satellite phone calls, which helped students understand the course content. Additionally, the 2010 comments showed that students perceived the adventurer as warm, welcoming, and engaged in the course. There was some focus in the comments on the task of bicycling cross-continent, and students expressed appreciation for the extreme nature of the instruction. Also in 2010, there were comments about logistical challenges in the course. For example, in 2010, a student stated, “The syllabus was really confusing...” and stated that instructors should “enforce time limits on student presentations.” Other student comments: “As close to being there without getting on a plane”; “This is one of the best courses I have ever taken”; and “[The adventurer] provided a ton of online resources and kept an audio blog everyday after he left [student’s emphasis].” In 2011, the comments focused on the adventurer’s satellite phone calls and audio blogs, but lacked the more positive tone offered in 2010. For example, in 2010, a student stated, “I loved the inclusion of guest speakers,” whereas in 2011 a student stated, “[The adventurer] called in every week,” in response to the prompt “What most helped your learning?” In general, comments were more detailed in 2010 than in 2011.

Increased Desire to Travel Abroad

Students perceived the course as increasing their desire to travel abroad. Students responded with a mean value across all years of 8.37, with a standard deviation of 1.88. There is some small variation across 2009, 2010, and 2011, with mean values of 8.17, 8.75, and 8.33, respectively, and standard deviations of 1.98, 1.65, and 1.97, respectively (Table 3). A Chi-Squared Test indicated that students perceived that they increased their desire to travel abroad each year, and combined across all years, as a result of the course (p < 0.01). A Welch’s t-test indicates that there is no significant difference in this aspect between 2009 and 2010, and 2011.

DISCUSSION

Rigor and Uniqueness

The results on course rigor indicate that even though the courses employed AL and SAE to varying degrees as alternative methods of instruction, students did not find the courses any more difficult than an average course at the University of Minnesota (U of M). This is of particular importance, given the added technical competencies required of students when working in a learning environment that relies heavily on digital technologies. For example, because essential course materials were posted online, students not only had to learn the content presented in the course, but they also had to learn how to utilize the CMS and accompanying technology. In 2011, the Ning CMS involved an even greater learning curve because of the expectation that students would use the online discussion boards. In this instance, students faced not only
potential technical barriers, but also social ones: interacting with academic content and other students in an online context requires a skillset different from face-to-face interactions (McGill and Klobas, 2009). So while students found the CMSs to be of varying levels of effectiveness, they did not find that they affected the overall rigor of the course.

The courses were perceived as highly unique, which could be expected; however, what was unclear was if over time the courses would be perceived as less unique as international online learning became more common on campus. Further inspection of the open-ended comments revealed that the AL instructional technique offered an authentic and engaging method. Student statements noted above support this point, and it is also well documented in the AL literature (Doering, 2005, 2006; Doering et al., 2008). Interestingly, as the courses became more focused on student-guided discussions and inquiry and less on guest speakers, students desired even more interaction with the adventurer’s travel-based context. This exhibits the power of further integrating AL and SAE learner-centered approaches to prompt students to engage in further systemic and systematic inquiry. During a student feedback session at the end of the 2011 course, students also discussed the desire to engage in more action-oriented learning during and after the course.

Increased Desire to Travel Abroad

One of the broader impacts of the authentic nature of the learning experience was that students reported that their desire to travel abroad increased as a result of the course. A larger U of M College of Food, Agricultural and Natural Resources Science initiative seeks to further develop students’ intercultural capacity. Courses of this nature could offer a gateway for students to explore international experiences in engaging, real-life ways without the added cost of travel abroad. This point is significant as higher education becomes more accessible to more people within the United States, who may not have the financial means to pay for costly semester-long travel expenses, but are still expected by future employers to have highly developed intercultural competencies. In the years since AGRO3480 was offered, the U of M has implemented other courses that utilize distance technologies to engage learners in international experiences. One major question remaining is whether quantitative assessments will show that such courses effect shifts in intercultural competencies.

Effectiveness of CMS

The positive response to the WordPress/WebVista CMS can be attributed to a few factors. For one, WebVista was already familiar to U of M students because it was used extensively in other classes. This may mean that students encountered few technical barriers. Additionally, the rise in perceived effectiveness of the WordPress/WebVista CMS in 2010 could be attributed to better delivery by the instructors because they had used the same CMS for the 2009 iteration of the course. When compared with Ning, it appears that students preferred the WordPress/WebVista, though it is unlikely that the results are statistically significant, and without a full representation of the class (an average of only 35% responded to the survey at the end of the course in 2011 because the survey was given digitally and many students did not return it), the sample is not necessarily indicative of the whole class population. The 2011 introduction of Ning was the first time instructors had used this CMS, and it is possible they were unable to use it to full advantage. Similarly, because it was the students’ first time with this CMS, they may have experienced some technical barriers. Also in 2011, when Ning was first used, general community members and K–12 students were using the site in addition to U of M students. These added layers of complexity may have led to an overcomplicated design of the CMS, leading to user frustration. That said, it appears that students did not visit the CMS any less in 2011 than in 2009 and 2010, despite the change in CMS.

One of the thrills and challenges of delivering a high-quality adventure learning experience is the heavy reliance on educational technology. As the course evolved, the content management systems changed from WordPress and WebVista to Ning. These are the most notable of the changes outlined in Table 2. The move from WordPress to Ning enabled the team to offer students added interactive functionality through discussion forums, and the chance to personalize their online environment through the My Page feature, which gave every student a Facebook-style wall that enabled them to project their identity more fully in a digital environment. Building social presence has been shown to enhance the learning experience, though only if the technology is effectively used (Annand, 2011).

Student Perceptions of the Adventurer

Interestingly, students perceived the adventurer differently in 2010 compared with 2011. They perceived the adventurer more positively in the earlier course. This could be due to differences in course design, adventurer online social presence, degree of in-class presence, or changes in student demographics. In 2010, the adventurer was in the St. Paul classroom for the first half of the course because his leg of the Tour d’Afrique ride did not start until midway through the semester. This likely allowed students to gain a greater personal connection with him and likely resulted in a more personal connection to the narrative of an adventurer bicycling cross-continent. In 2011, the class experienced the adventurer primarily through the CMS. This lack of face-to-face interaction could have resulted in the less-positive response to the adventurer, or it could reflect problems students said they had in utilizing the CMS. It is also possible that the adventurer was less focused in his communications due to the added responsibility of overseeing and teaching three U of M undergraduate students who were accompanying him on the 2011 ride. Regardless, this result further indicates, consistent with findings in the literature, that it is of utmost importance for an adventurer to portray a strong online social presence (Annand, 2011). It is worth remembering here that a primary reason for shifting to the Ning CMS in 2011 was Ning’s increased capacity to build social presence. Perhaps in regard to establishing a personal connection to the adventurer, this goal was unsuccessful, and the technology may not have been used effectively.

Rationale for Combining Use of AL and SAE

As a stated objective, we wanted to document whether combining AL and SAE could be an effective pedagogy for agroecology instruction. When employing AL and SAE strategies, logistics are everything. Not only did the adventurer need to perform a physically demanding feat, but he also had to capture and process multimedia, and deliver coherent, high-quality instructional material to students via (sometimes unreliable) online infrastructure (Miller et al., 2008). Students’ open-ended responses indicated that they sensed
some logistical challenges in the delivery of the course in 2010. This would reflect instructors’ perceptions of the 2010 course as well. The course was being co-taught for the first time, which presented some logistical challenges. It appears that these logistical challenges were largely smoothed out by the 2011 course based on student responses, though new challenges were introduced with a different CMS. Overall, though, students’ responses indicate that AL could be an effective pedagogy for agroecology instruction.

Through a series of reflective discussions between the instructors and teaching assistants involved in AGRO3480, a few themes emerged about integrating SAE and AL. First, they stated that AL and SAE are profoundly compatible and complementary theories. Where AL fell short in describing food systems education, SAE could fill in the gaps, and vice versa. Because of their complementary theories, few theoretical tensions exist. However, main issues arose through practical implementation. One of the challenges in offering an undergraduate course of this nature was providing students with enough background knowledge to be able to fully engage. Ideally, through teamwork and group discussions, students would have been able to teach one another from their unique disciplinary perspectives, which did happen to a greater degree in 2011. But not all students had an adequate understanding of the relevant content areas to be able to make the kind of strong statements and connections that enhance learning. In these instances, instructors attempted to provide essential information largely through in-class discussion, although some questions were never fully resolved. The instructors felt that this issue should be more fully addressed in combining the theories: How do we prepare undergraduate students for complex, integrated analysis across multiple disciplines? This could involve recruiting students more heavily from disciplines that would provide a balance of disciplinary understanding in groups (Table S5). Other ideas involve creating an online repository of core content modules that students could refer to if they lacked specific areas of understanding. Another idea was to offer the course only to graduate students because they would potentially have a fuller background in the disciplines needed for systemic study. Although this revelation is not new within multidisciplinary courses, it is an essential issue that remains to be addressed.

Overall, results from this analysis further validate the major claims made by AL and SAE. Adventure learning increased student motivations to learn, and brought them into new experiences. Students were impacted by experiencing different agroecological contexts through the reports of the adventuring, and were encouraged to think systemically and systematically. However, effective logistics and learning technology usage can greatly impact learner experiences, and need to be used cautiously and effectively, something many instructors may potentially struggle with.

CONCLUSIONS

In the novel course offering AGRO3480, in which students followed an adventurer as he bicycled for days on end, they were exposed firsthand to the tremendous agronomic diversity across two continents. In Africa they learned about the importance of the Nile River in providing irrigation for sugarcane in Egypt and cotton fields in Sudan; exotic and indigenous crops like teff and ensete in Ethiopia; flowers grown in greenhouses for export from Kenya, multicropping on small landholdings of subsistence farmers in Tanzania, rice production in Malawi; agroforestry in Zambia; cattle herds and ranches in Botswana and Namibia; and rooibos tea production in South Africa (Fig. 1). In South America, the students were exposed to the transformation of the Pampas in Argentina, the Mediterranean and desert climates in Chile, the Altiplano cropping systems in Bolivia, and the ancient terraced agricultures of Peru. The adventurer shared details of the more than 27 African and 13 South American ecosystems he encountered (http://world-wildlife.org/science/wildfinder/) and articulated how human beings have transformed those ecosystems into agroecosystems through their quest for food, fiber, and shelter.

Surveys showed that students gained an appreciation for transport of food and agricultural products, and the limitations that a lack of infrastructure can place on productivity. They experienced in a virtual environment stories of the daily need for food, water, and fuel for cooking. They learned how people access food. They saw the contrast between organic vegetable production in Chile intended primarily for American consumption, and extreme poverty in Bolivia. They were curious to learn that virtually all the food consumed in Africa by the bicyclers was grown in Africa, and most was fresh and minimally packaged. The sights and experiences they encountered via the adventurer’s narrative, triggered questions and lively discussion on a wide range of topics. They were exposed to the intersection of South American politics with access to land and land use. In 2011, one activity asked students to consider Bolivia’s land redistribution programs. Midway through the activity, the comparison between the United States’ land history and Bolivia’s was made. After, students reflected on the tension caused in their mental frameworks because of the similarity of the initial situation in both countries where wealthy individuals purchased or stole land from indigenous peoples.

Systems action education and adventure learning fit well together at the process level and can effectively increase student desire to travel abroad and explore course content they would not otherwise because of the uniqueness of the course content and delivery method. By merging the two methodologies, the classroom experience was more alive, and seemed to elicit a greater reaction from students than a lecturer or guest speaker. They share a common theoretical background, and complement weaknesses in the reciprocal method. For future educational designers looking to merge AL and SAE, we would recommend utilizing technologies that students are already familiar with as possible, ensuring the adventurer has a strong online presence through active and consistent engagement in the online network, and having contingencies for when things happen that were not planned, as they most certainly will. In the realm of theory, more work is needed to weave both approaches together into a cohesive theoretical framework that can be implemented in food systems education. Adventure learning projects present many challenges that need to be overcome, ranging from technological and logistical to physical. The results indicated that although transitions were made in 2011 to increase online social presence, the technology or the implementation or both were somewhat flawed. These challenges were present, but none was too great to overcome. Most importantly, the learning experience encouraged students to learn and explore the world beyond themselves.

ACKNOWLEDGMENTS

We thank Nicholas Jordan, David Pitt, and the reviewers for their keen edits and feedback.
REFERENCES


