

Combining Study Case and Learning Group Approaches to Teaching Agricultural Environmental Management Systems

Undergraduates interested in learning Agricultural Environmental Management Systems often observe this applied course late in their college career, resulting in a need for different techniques in teaching beside traditional lecture. Other teaching approaches are needed to enhance student ability to better understand the subject matter and improve the thinking skill to integrate student knowledge into the “real world” problems. One important aspect to consider in teaching agriculture courses is that students learn more about agriculture through experiences that link classroom activity to field work and engaging a broad range of topics (Parr et al., 2007).

Agricultural Environmental Management Systems course have been taught using combination of lecture (90%) and assigned laboratory (10%) activities. Lecturing provides advantages, such as a time-honored teaching approach and a good organization because the materials are derived from published textbooks, and allowing students to have an optimal access relative to resources needed (Little & Sauer, 1997). However, the effectiveness of lecturing as an educational technique has been brought to question for many years (Ahern-Rindell, 1999). Previous studies show lecturing creates passive learning, poor information retention, limited learning and low thinking skills (Aher-Rindell, 1999; Crowther, 1999). Assigned laboratory activities related to soil erosion, aggregation and water movement in soils provides insufficient knowledge for students. Lab reports and informal interactions with students indicated that students' knowledge and understanding of course content was limited. Their skill and understanding to apply the knowledge to new problems and integrate the lab results into what they found in the farm was poor. These students had limited understanding in applying basic concepts of soil aggregation and soil-water relationship to solve practical problems regarding to the impact of agricultural management on soil properties. To address these issues, a combination of study case and learning group approaches were applied.

A study case-based learning provides opportunity for students to more actively engage in the subject matter of course, especially in agricultural sciences (Ha & Shively, 2005 and Simmons et al., 2005). A learning group approach is an important education

technique that can effectively assists students regarding to multi-situations in agriculture by interacting various knowledge and foster innovation (Jiggin and Röling, 2000; Jordan et al., 2003). At the beginning, students developed relationship by sharing knowledge, goals and solutions to specific cases to get mutual learning. Finally, new knowledge was created from both individual and shared observations (Röling and Jiggins, 1998) which generated new solutions and innovations. By doing this approach, students' self-esteem and self-confidence increased and the ability to integrate their previous knowledge into more practical problems improved (Rowlands, 1997).

These approaches can bridge the gap between materials learned in class, laboratory and real world problems (Graveel, 1996), as well as provide students with better opportunity to do active learning. Specific cases related to agricultural and environmental problems can help students to investigate the context of the course of materials more deeply. A set of case studies consisting of 20 topics was used as a weekly class activity. The topics were agroforestry, best management practices, biochar, biodiversity, carbon sequestration, conservation reserve program (CRP), cover crops, genetically modified organisms (GMO), deforestation, erosion, land use change, organic farming, overgrazing, pesticides use, soil acidity and salinity, soil quality, tillage practices, traditional ecological knowledge, urban farming, and water pollution.

Students gave positive feedbacks with respect to these teaching approaches. Presentation and discussion of selected cases provided conducive and participatory environment in which the students were taught to be active and more engage to the topics. They eagerly tried to integrate their basic knowledge into the case. These approaches proved that students found better learning environment compared to lecturing technique by allowing them to be more creative in thinking and expressing themselves based on their own opinion and previous knowledge. A student presentation acted as an outlet for capturing student's creativity and communication skills. However, their skill and performance during presentation varied substantially. The better students used diverse techniques to deliver their presentations by using videos, demonstrations, bringing soil and plant samples, posters, nice graphs, and applying instructor's suggestions during presentation practices.

In conclusion, these approaches significantly enhanced student learning and thinking beyond the traditional lecture and laboratory activities. However, continued evaluation of the effectiveness is

still needed because students have diverse ideal learning environments and styles.

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The Syllabus Contract

We all have a syllabus; each and every class, each and every semester. It is often times referred to as our contract with the students. It informs the students in the class what is expected of them. However, the syllabus rarely presents what is expected of the

professor on behalf of the students, with the possible exception of the requisite weekly office hour. I have used an exercise on the first day of class that remedies that situation and gets the semester off on a positive note.

I teach landscape architecture at Texas Tech University. In our design studios, we assign design projects by presenting a problem statement and minimum requirements. Some scholars have referred to our project assignments as the "wicked problem" in that there is no one correct answer and every student will probably (and should) have a different solution. Our goal, along with accuracy and quality graphics, is to have students make critical decisions about design options and be able to defend those decisions. It is often frustrating for students who are used to high school performance tests, multiple choice and true/false questions, or the algebra problem with one correct answer. An important part of the process is one-on-one student/teacher interaction in the design studio. So what does this have to do with the syllabus?

On a few occasions (when I remembered) on the first day of class, I have presented the syllabus as usual and explained that it describes what I expect from you, the student. I then ask, "What do you expect of me?" I'll even write "Student Expectations" on the white board. After their initial shock subsides, someone will timidly offer a suggestion; then another, and another and eventually other students are nodding their head in agreement. Invariably, they have asked for clear instructions, fairness, time with me at their desk, timely feedback and, in some form or another, respect. In my experience, the exercise accomplishes several things. First, it gives me the opportunity explain again my expectations that they solve their design problems in a logical, creative and well thought out manner. That I'm not going to give them an answer, or say that their design solution is wrong if they can logically defend their solution. I even explain the term "wicked problem" and the notion that good design is "when it no longer makes sense to ask why." (Which is not my quote but I am not able to attribute it to a particular individual.)

Secondly, the exercise lets me know what they are truly concerned about or are fretting over. If they believe I care and will pay attention to their concerns they begin the semester with a little more self confidence. It is important to note here that genuineness is essential or the entire exercise is counterproductive. Finally, it gets them to buy into their side of the responsibilities expressed in the syllabus, if they know I intend to buy into my responsibilities as a professor. Try it, you might like it!

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Learning by Doing

The guiding principle of designing educational opportunities for youth should reflect both the philosophy of “learning by doing” and focus on content that is based on proven facts (research based). “Learning by doing” is active, hands-on and engaging for students. The goal of this teaching approach is for learners to construct mental models that allow for 'higher-order' performance such as applied problem solving and transfer of information and skills (Churchill, 2003). Essentially, developing lessons plans should focus more on “making, producing, practicing, and observing” exercises rather than teacher directed lecture. How do educators develop such an approach? Here are a few quick tips:

1. Enable Students To Work Together: Collaborative learning is a method of teaching and learning in which students explore a significant question or create a meaningful project together as a small group. An example of a collaborative activity is challenging a small group of students to generate a list of skills that are needed to be a successful leader or asking the small group to identify what they think is the best way to generate funds for class project. When facilitating quality collaborative experiences, two things can occur. First, collaborative environments allow students to share their own experiences that in turn translate into teachable moments for others. Students transition from learner to teacher within these small groups. Small group collaborations allow students to learn how to utilize and collectively benefit from the strengths of individual group members. Secondly, students begin to master the skills of group work. Team work, group communication, compromise, and listening are all enhanced by the experience.

2. Self Directed Group Exploration: In today's world of internet and multi-media tools, getting fast information and tons of it is easy. Long gone are the days of library card catalogs and copying encyclopedia and journal pages for research projects. With the stroke of a few keys, tons of information is loaded onto the computer screen. The challenge for students, with assistance from educators, becomes wading through information overload to identify what is fact and what is fiction. Promoting self directed investigation and research impels students to rely on the evidence instead of upon authority (text, teacher, parent) (Haury and Rillero, 1994). Most students live in an authoritarian world with little or no opportunity to practice decision-making because nearly everyone tells students what to do and when to do it (Haury and Rillero, 1994). Learning how to navigate through information for the purpose of a group activity will enhance competencies in fact finding and independence. For example, educators may challenge students in a small group to explore what type of pet rabbit is best suited for a cold climate environment or what is the best design for a rocket. Students will begin to learn how to answer their own

questions using valid research tools.

3. Sharing results and products of the activity based experience: A key component to a successful “learning by doing” approach is providing the opportunity for students to share their results of the experience and self evaluate their performance as a group. After allowing students to summarize their experience or share the knowledge they acquired from an activity it's valuable to ask the question “if you could do the activity over, what would you differently?” or “what improvements would you make?” These types of reflective questions allow students to self-identity improvements and enhance visionary thinking. Educators can also use this sharing period to help students link what they have learned to other life experiences. For example, educators may ask “how is working in this group similar to being a teammate on a sports team?” or “what were some effective ways you communicated with your group that can be used when you are serving on student council?” Lastly, the sharing period of activity based learning is important because it communicates the small group experiences to the larger learning group.

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Outside of Class Reading of Scientific Journal Articles is Invaluable, and Helps the Instructor Just as Much as the Student

I expect all of the students in my classes [AS 345 Animal Growth and Development; AS 346 Skeletal Muscle Physiology] to be capable of integrating numerous physiological concepts at the same time. I dread each semester, as I know that 3-6 students (out of 25) will likely drop each class, even though my grade standard is such that there (in reality) is no grade pressure on students [A will be given to those within 10% of high individual; B to 20 % of high

individual, so on; $F < 55\%$ of total score possible]. Moreover, I allow students (individually or in groups) to correct missed answers for 1/2 point each. I also place extra credit questions on each quiz and exam, but do not give any credit unless the entire answer is correct. Even with these items in place, I have been told on student evaluations that my classes are quite hard, and that taking my class is an exercise in learning how to take a physiology exam.

Over the years, I have tried a variety of alternative methods to get the students to absorb physiological concepts in the classroom. Some worked well, and others have not. Providing the reference to (very) current scientific papers during lecture, then making it a requirement that each student must review one such paper per semester has worked well. The process is this: I lecture on (say) growth hormone being a catabolic repartitioning agent. During the lecture, I provide students with 2-3 current references to survey papers on the specific topic. The students read, analyze and reduce the content of the paper. Then they begin writing their report to me, which they must address the following: Based upon what I have said on this topic (in class), what have you learned while reading and analyzing this paper? I do not ask about the content, but examples from the paper may be used in their write-up. The students may choose the paper at any time throughout the semester. So, if a topic is more of an interest to a student, then the student has an investment in doing it. After they have their first draft, they are allowed to turn-in the paper for a pre-grade review (by me). Moreover, if they have finished their paper requirement, then any (additional) paper that they might desire to read, they may do so and turn in a similar report (without pre-review) for a few points of extra credit. This process has allowed students that may not do so well on a quiz or an exam to gain points outside of class. In addition, it has allowed students to "bank" points in case their in-class performance may not be as good as they thought.

I (personally) like doing this for an additional reason. For students that do papers over the course of the entire semester, it is neat to see how much their confidence increases. The first paper that they might attempt is usually something like a "Bart Simpson" book report. However, by the end of the semester, most students that do more than one paper firm up their reading/writing and it is easy to see that they have grasped the physiological idea that I wanted them to get. Considering the multitude of pathways, regulation, and concepts that are involved in these two classes....anything that helps the student also helps me be successful in my teaching efforts. Moreover, it should not be about learning how to take an exam.

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Building a Social Learning Community

Learning takes place inside and outside the classroom, most notably in social environments with stakeholders and other members of the local community. We recognize and foster this engagement of students with instructors, with those outside the immediate agroecology group on campus, and with each other through informal events that bring people together to get to know each other better.

Learning Objectives are to 1) promote communication and trust among students and with faculty and stakeholders, especially important in a learning group with people from different countries, native languages, and disciplines, 2) establish a non-hierarchical communication structure among members of the learning community to promote information exchange and trust, and 3) explore personal and cultural interests and promote improved understanding among diverse people through events in a social setting outside traditional classroom and field activities.

Methods that have proven especially effective to build social learning among the diverse students and instructors in the Norway MSc Programme in Agroecology include *potluck dinners* organized by faculty. We have taken advantage of the space and facilities available in the university guest house to sponsor two dinners each term where students prepare food and share with the group in an informal setting on a weekend night early in the semester. The first potluck includes dishes made by students to represent local foods from their countries, often a challenge to find needed ingredients if they come from a very different food culture. The second has been a meal prepared entirely with local ingredients, with "local" defined by the group in a short session in class a couple of days before. We debate whether this should be within the county, the agroecoregion of southern Norway, the country, or some larger foodshed area. Most years the decision is to use only Norwegian ingredients, and this presents some challenges. *Informal group dinners* are organized by teams that work together in the field projects, by students in nearby living areas, or around celebrations of birthdays or other events. These are often held in the student dormitory area, and include friends of the current year agroecology students and from previous groups. *Weekend waffle breakfasts* have been organized for several years by visiting faculty to bring small groups of 4-6 students together with people from the local community, and often five or more of these are held to include all students at least once during the term.

Outcomes we observe are based on informal observations and discussions with students, and not on any formal evaluation process. In general, the social events are a great surprise to many students who have never found this type of activity as a part of the learning environment. Some come from academic

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cultures where instructors just don't invite students to their homes, and instructors are not invited to student gatherings. Since the dormitories are not integrated into the local community, many students do not make the contacts in the Norwegian community that could enrich their cultural experience, and they spend all their time with fellow students. The potluck dinners and breakfasts help to bridge this chasm between town and gown. There are always graduate students, visiting faculty, and other instructors who participate in the agroecology course who are invited to the dinners, and this further expands the student contacts.

In 2010, a student from Iran arrived an hour late, and informed us that he would be able to eat after sunset. He had prepared Persian food to share with the group. He later wrote in our small guest book, "Today is the first day of Ramadan, and I was just so lonely in my flat because this is the first time in my life that I have been outside my country and so far from family and close friends. I almost did not come to the dinner. But then I came and tonight you are my family." What an incredible emergent property from the potluck dinner!

The informal dinners in the dormitories are sometimes organized around a celebration, or a group meeting in the evening, or at times for a seminar on a specific topic that people feel needs enrichment and more information from someone within the group. At times they appear to be spontaneous meals or dessert gatherings, sometimes with music or games, but usually just rich conversation. These often attract flat-mates and friends who are not agroecology students, and faculty are sometimes invited, and we find this a way to expand the ideas of holistic learning and importance of community.

The waffle breakfasts introduce students to a food new for many of them, and to people from the community. With a small group around one table, the simple fare of waffles, fruit, juice, coffee and tea appears to go over well, and we are sometimes joined by graduate students who live in the guest house. People from the community are especially popular, since they can answer many questions about Norway and cultural things that students have observed and not been able to ask about. These social events have been highly popular, and our informal evaluation affirms that all of them should be included each year in the agroecology activities.

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Use of Structured Debate to Analyze Agricultural Issues: Large Scale Dairy Operation Simulation Exercise

Instructions for Teacher

This exercise is designed to highlight various perspectives in current agricultural issues. A structured debate provides an opportunity for students to explore various viewpoints and practice effective communication and conflict management techniques. It is suggested that students be assigned their respective role (in teams) within this activity and be given adequate time to research the assigned viewpoint to debate effectively. The students, in this exercise, will be presenting their viewpoints (arguments) to the "Legislative Committee." The "Legislative Committee" (which can be represented by the facilitating teacher or other individual), will give feedback on the effectiveness of their presentations in this hypothetical situation. Explain to the students that they will be presenting their arguments to a "neutral Legislative Committee" with limited direct knowledge of agricultural production. Distribute the "Purpose, Background Information, Situation, and Format" to students in advance of debate time. Approximate time to conduct the activity and concluding discussion: 1.5 to 2 hours. This activity can be reformulated for use in evaluating a number of current issues.

Purpose

This exercise is designed to increase our awareness and understanding of the diverse perspectives and dimensions of a political agricultural issue. You will be challenged to research and advocate a particular position focused on the possibility of a large scale dairy operation entering "Harmony County."

Background Information

Participants will be assigned to one of four groups. Each group will play an active role in the simulation.

1. PETA: People for the Ethical Treatment of Animals. This group is actively opposed to the use of animals in production agricultural settings. They are vigorously opposed to large scale livestock operations.

2. Non-Farm Neighbors: The proposed location of the dairy operation has a diverse set of non-farm neighbors. A number are working professionals with limited understanding and exposure to agriculture. A number of newer high-dollar residential homes have been built in the vicinity of the proposed operation.

3. Harmony County Farm Bureau: This group represents Harmony County Farm Bureau. Farm

Bureau is a grassroots farm advocacy group that supports diverse agricultural interests.

4. Milky Meadows Dairy Incorporation: You are the group of operators working to plan, construct, and operate the large-scale dairy operation.

Situation

Milky Meadows Dairy Incorporation is seeking the approval from the “Legislative Committee” to construct and build a 3,000 cow dairy operation in “Harmony County.”

Format

Each of the four special interest groups will have the opportunity to “lobby” three times during the simulation exercise. Naturally, your goal is to ensure your “voice is heard,” and impacts the decision of the Legislative Committee (instructors). Each group will need to present the strongest possible case to the Legislative Committee and to, perhaps, respond to arguments presented by other constituency groups.

First Round Debate (5 minutes for each group)

- PETA
- Farm Bureau
- Milky Meadows Dairy Incorporation
- Non-Farm Neighbors

5 Minute Break (Preparation for Second Round)

Second Round Debate (4 minutes for each group)

- Milky Meadows Dairy Incorporation
- Non-Farm Neighbors
- Farm Bureau
- PETA

5 Minute Break (Preparation for Third Round)

Third Round Debate (3 minutes for each group)

- Non-Farm Neighbors
- Farm Bureau
- PETA
- Milky Meadows Dairy Incorporation

Discussion/Application Questions for Students

• Was it hard representing your particular group in the debate?

- What teams/groups presented the most powerful statements/arguments in the debate?
- What were those statements/arguments influential?
- How do you think the non-farming public would view this situation and the information presented?
- How can we best present the viewpoints of agricultural production to a “non-farming” public?

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Is Our Next Generation of Scholars Going to be Capable of Affording Us?

I am puzzled by the budget situation in our state (Washington)--not because the state budget is in the toilet, but (rather) how distant budget decisions have long-term effects on us in academia. Due to lost revenue at the state level, Washington State University (WSU) has lost millions of dollars in cuts. As Washington State must have a balanced budget, I suspect that we (at WSU) will experience more cuts in the next biennium since we represent a large expenditure at the state level. This same situation exists at all institutions of which I know faculty members. Everyone is trying hard to "get through" the shortfall times.

Our academic leaders are being quite creative in determining how to make cuts work, and how the resultant university will look. At the department level, in many cases, simply to remain in one piece after a major budget cut is something positive. During these "lean" times I have asked myself--what will the long-term effects of this recession do to the (general) future of academia? How many years will it take to recover, or will we ever do so? If we raise tuition to make-up for lost state support, is our next generation of scholars going to be capable of affording us?

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