Teaching Log – Fall 2015 – Introduction to Environmental Science (ESCI 1301)

Sept. 29, 2015

I have been working on the activity for next week’s class based in part on unit 1 from the “A Growing Concern” module. This is the first time I have used material from this module. The activity goes well with a chapter on agriculture and soils. I only have about 2 hours to cover the material as the students have an exam next Thursday. For Tuesday (October 6) I will have them work on the landscapes activity. I plan to start with them looking as individuals at two photos (one of an agricultural area and one of a non-agricultural area) and fill out a modified version of the table given in unit 1. I have made color copies of the two powerpoint slides that show photographs of landscapes to hand out to the students for this activity. The room I teach in is so large that the students cannot see the details of powerpoint slides very well. I will also post the slides on-line so students may view them on-line during the activity if they have an electronic device. My class has almost 130 students and I split them into 32 groups for working on activities throughout the semester. I thus made 32 copies of the photos and then cut them into individual photos so each person will look at 2 photos and make notes on what they see. Then they will get together as a group to discuss their findings. I am assuming it will take them about 20 to 25 minutes to complete this activity and then they will move on to a second activity where I have them calculate the ecological costs of what they might have eaten for breakfast.

Oct. 16, 2015

I used the “observations of agricultural landscapes” section of unit 1 of “A Growing Concern” on Tuesday, October 6. The activity followed a ~25 minute lecture related to agriculture practice, food, and soils. Dr. Jim Kubicki attended the class to get an idea of how I run my class since he will teach a section of ESCI 1301 in the spring. I had stapled copies of the photos that the students needed to look at to their activity sheet and I needed to walk around to various groups and tell them it was OK to take out the staple. Some students still kept them stapled to the sheet – I’m not sure that was the optimum way to look at the photos, especially when comparing them as a group. But there is the difficulty of trying to keep them together in the folder without stapling them. A few students did not read the first part of the group activity sheet where I gave them definitions of the terms they needed to use to describe their photos (i.e., topography, attitude, evidence for erosion). It might be better to add the terms to the individual parts of the sheets the next time I teach it. Once the students came together as a group quite a few of them spread out all the photos and looked at them together. Most groups had completed the activity within 30 minutes and moved on to the second part of the activity (not an InTeGrate unit) that dealt with calculating their water and land footprint based on a hypothetical “breakfast” of eggs, bacon and milk. I asked one of my teaching assistants to scan examples of what he thought represented an exemplary effort and an effort where the students put little thought into the activity. I also have saved several other examples for scanning. I am not asking a specific question on the activity on the next exam (on October 22) but general questions on the impact of farming on ecosystems will be given. I randomly asked several students how they liked the activity as they were leaving class that day. Most indicated they thought it was interesting and something completely different than they had thought about before.

October 29, 2015

I completed the two units on mineral resources. I assigned on-line reading materials on phosphorous as part of their weekly reading assignment. In the reading assignment I specifically asked them to summarize the on-line reading and tell me if they had learned anything new about the phosphorous cycle (compared to what we had briefly covered in chapter 2 of our books on the water, C, N and P cycles). Most people indicated they had learned new concepts or that the reading helped remind/reinforce what they had learned in chapter 2.

I also assigned the battery activity as homework and the students submitted it to Blackboard. I was pleased with the responses, most were relatively complete and thoughtful. The activity was due before class but I extended the submission window by 2 hours to accept late homework. Most of the late homework was less complete.

The students completed the unit on the economics of batteries in class for an activity on October 27. I received fewer questions from students this year regarding the calculations – it seemed most were fairly comfortable making the calculations. They also had less trouble with the concept map since I added some text to explain what a concept map.

At the start of class on October 29th I gave them a battery quiz. It was the first thing I did after having the usual brief announcements about upcoming homework and exams. For several weeks it was obvious that students were coming in late and skipping most of the “mini lecture” I give. The “mini lecture” goes over some important concepts from the book but I ask think/pair/share type questions and use voting cards to gauge student knowledge during this time, as well as to link book material to topics of local relevance. Their exams cover the local material as well as the book material. In an effort to get more people to show up on time I had been randomly giving quizzes or short extra credit activities at the beginning of class. Yesterday it was raining fairly heavily and several people walked in late wanting to take the quiz (over 10 minutes into the class) and I wouldn’t allow them to do so. I do not believe the quiz results were as good as last year – but I will need to compare. I asked the same 3 questions as last year. The first dealt with materials in rechargeable batteries (only 2/95 got the answer completely, 53/95 mentioned at least 2 of the 4 materials, and 40/95 mentioned only one material, although I explicitly told them there could be more than one right answer), the second question asked whether mining would increase or decrease as the price of a material increased. Only 41/95 got the correct answer. The third question asked students to predict from a list of 5 possible scenarios which of those scenarios would cause an increase in a mined resource. 20/95 students selected the 3 correct scenarios, 25/95 selected 2 out of 3 correct scenarios. I think many students did not readily grasp the idea of having more than one correct answer.

For the group activity the students each read material related to the use or mining of phosphorous and answered a set of individual questions. This was followed by a group discussion of the pros/cons of mining, uses of phosphorous, etc. In essence it was a modified jigsaw activity. Students who are not that fluent in English really struggled with the short readings. But most students seemed to do well and helped each other through some of the individual activities (like those that needed some calculations).

November 9, 2015

I just finished grading their exam that included questions regarding the minerals units. Here are the questions I embedded on the exam:

Which of the following mineral resources is used to make rechargeable batteries?

1. lithium (b) mercury (c) halide (d) gold (e) calcium

119 correct 3 wrong [98% correct]

Suppose a new mine for rare earth minerals is opened in Sierra Blanca, Texas.

(a) If a new type of battery is developed that needs more rare earth minerals what will happen to the price of the minerals? 112 correct 10 wrong [92% correct]

(b) If 5 other new mines for these minerals are opened what will happen to the price of the minerals? 113 correct 9 wrong [93% correct]

(c) If the Environmental Protection Agency suddenly tells all mines in the United States that they must adopt a new mining method that pollutes less what will happen to the price of the minerals? 112 correct 10 wrong [92% correct]

(d) What is one other factor you can think of that might decrease the price of the minerals? 105 correct 17 wrong [86% correct]

NOTE: 6 students gave a correct answer that was a variation of the factors mentioned in questions a through c. I did not count as being correct because I asked for one other factor.

Naturally how does phosphorous end up in the soil?

1. decay of animals and plants on the surface (b) weathering of rocks (c) dissolves from atmosphere (d) from streams and lakes

52 correct 70 wrong [43% correct]

The phosphorous question really seemed to cause them trouble.

I also gave them the short environmental justice activity at the start of class. I scanned their responses so I could evaluate them later.

November 11, 2015

Yesterday I had the students work on the Love Canal activity. Before I began the activity I showed the powerpoints, the animation on permeability (which I did not show last year) and I discussed how Love Canal related to environmental justice. Similar to last year a few students just got blank looks when they saw the questions where they had to calculate how long it would take the contaminants to flow from the waste site to people’s homes. I think some caught on when I compared it to the problem of calculating how long it would drive somewhere given the distance and how fast you could drive. One problem I did not anticipate or remember from last year was that some students’ cell phones did not have calculators that could handle exponentials or large values (like number of seconds) that are needed in this calculation. Not having a smart phone (nor using my cell phone as a calculator) I do not know how easy it is to download a free app for a scientific calculator, but I would need to think about it the next time I did this or try and simplify the math for simple calculators. Otherwise the activity appeared to go well. I am about to grade the on-line homework where the students needed to build a timellne of the events that happened at Love Canal. A total of 97 students completed the timeline homework before class.

November 12, 2015

Spent first part of the class talking about groundwater issues related to El Paso and how dependent we are on water, how we conserve water, how we will find it in the future, and how it might limit our growth. Then I gave them the Love Canal unit quiz. I am scanning the quiz and then will grade it. Following the quiz I discussed the Ogallala aquifer and then started them on the activity. Some students had difficulty downloading the USGS data (homework prior to class). Others had forgotten to do the homework. Some did not bring a copy of the well data with them to class. Only 37 students completed the homework prior to class. There did not seem to be many questions related to the activity (except what to do if they didn’t have well data or enough well data).

Results of grading quiz: 105 students took quiz

1-Question related to determining which feature would be contaminated first ( note: few people got all answers correct, I just tabulated if they got the right feature in the first, second, third and fourth places):

47% determined river would be contaminated first

34% determined well 1 would be contaminated second

41% determined well 3 would be contaminated third

47% determined well 2 would be contaminated last

Many people switched orders between river and well 1, well 1 and well 3, and well 3 and well 2. They were not counted corrected for the above tabulation, but were given partial credit in grading.

Multiple choice question 2 (contamination at Love Canal): 59% correct

Multiple choice question 3 (on Lois Gibbs): 88% correct

Multiple choice question 4 (on properties of clay): 71% correct

Multiple choice question 5 (on CERCLA): 81% correct

I have posted the answers, but will go over question 1 in class as a similar question will be on the exam.

November 19, 2015

I assigned the “forecasting and adaptation to climate change” (from unit 1, Climate of Change) as a homework reading and then asked the multiple choice questions as a homework assignment. 93 students completed assignment and turned it in to Blackboard. Thus, it was more of a reading comprehension assignment since they were allowed to look at the reading (or even work with friends on it). One student gave answers that were not choice (like letters “H” or “E”) indicating they did not understand the instructions. Of the other students answered the questions as follows:

1. For the Andean people, which of the following crops are sensitive to climate, and require adjustments to planting time in order to ensure a good harvest? 94% correct
2. Around which time of the year do the people of the Andes observe the constellation Pleiades?

96% correct

1. The decision of whether to plant crops in December, rather than October is made when:

71% correct

1. What did Dr. Orlove use to verify the Incan forecasting technique? 92% correct
2. On the Yucatan Peninsula in Mexico, scientists have been able to learn about the climate that affected the Mayans by: 89% correct
3. On the Yucatan Peninsula, what makes the lakes of Punta Laguna and Chichancanab ideal for gathering sediments? 85% correct
4. Work by the science team from the University of Florida suggests that the collapse of the Classic Mayan civilization, and abandonment of Mayan cities coincided with which of the following climate phenomena? 97% correct
5. What is the annual range of average daily maximum temperature in Greenland? 98% correct
6. What did Dr. D’Andrea and colleagues examine in Greenland lake mud samples, in order to infer a record of temperature over the past 5000 years? 89% correct
7. It is thought that the Vikings abandoned their Greenland settlements because 97% correct

The students who answered #3 incorrectly appeared to favor the answer “it rains in October” over the correct answer “when the villagers have an obscured view of the Pleiades” – but I’m not sure why.

We did a modified gallery walk in class to answer 3 questions associated with the reading. We taped large sheets of paper to the tables in the class rather than on the walls since this would allow students to move around more easily in a class of ~120. The students were given sheets of paper with a table telling them which table to go to and in what order. Their group’s specific assignment was highlighted in yellow on the sheet. Unfortunately, I forgot my USB stick with the detailed instructions that I could also project on the screen in front of class and had to hastily write a few notes that were not as detailed. A few groups were still confused about whether they had to write on the large sheets of paper or their small handout, but I think one or two small changes to the instructions will clear up the last of these problems. Once they understood what they were to do (writing answers on the big sheets) the movement of the groups between tables to answer the questions went well and smoothly – much better than last year. I think. Most groups finished in 30 minutes (all the time we had since an exam was also given that day).

I gave students an exam with the following embedded questions with results as follows:

Which of the following are fluxes in the water cycle? 55/57 correct = 96%

Permeability refers to the ability of soil to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. 99/120=83% correct

The water level in the Ogallala aquifer is dropping primarily because of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ use. 93/120=78% correct

An area of land that drains all the streams and rainfall to a common outlet, such as the ocean, is called a(n) \_\_\_\_\_ 29/60 = 48% correct

Lois Gibbs \_\_\_\_\_\_\_\_\_\_. 118/120=98% correct

Which of the following are sources in the water cycle? 37/63 = 59% correct

The students had the most trouble with the definition of a watershed, only covered in the activity on surface water and not repeated. Surprisingly, the students had more of a problem determining a source of water in the water cycle from a list than a flux of water from the water cycle. The Lois Gibbs question was on an earlier quiz and most (98%) got it right.

November 24, 2015

Today we did the climate of change unit 2 activity on changes of temperature/wind, precipitation and pressure in the Pacific. I gave different groups different data sets and they had to fill out the summary table themselves rather than trying to stop the class and discuss the table midway through the activity. This seemed to work well since various groups had to wander around and talk to other groups about their findings. In my overview to the activity (with practice on reading the maps) I had forgotten to point out the wind direction arrows, so I needed to make sure groups that had the SST and wind maps understood how to do that part. We had a quiz prior to the activity, so they only had 40 minutes (instead of the usual 50 minutes) for the activity, but most finished on time. I could see that some were starting to make connections between the SST maps and what they had been hearing about El Niño in the news (although I have not yet mentioned El Niño in class, they have read about it in the book).

December 1, 2015

Today the class worked on the climate of change unit 3 activity on ENSO. The class did not get started on the assignment as early as I would have liked since we had a guest speaker talking about a new research program at the beginning of a class. Although I went through the introductory power points and explained the “regular” and “El Niño” cycles there seemed to be more confusion about the differences in the cycle than there was last year when I taught the same unit. It could possibly have been that enough students missed the November 24 activity (where they saw ENSO in the maps of changes in Pacific temperature, wind, precipitation, and pressure) that they didn’t readily understand how the changes in the cycle produced different climate patterns. The last exam in the class has questions that will assess how much they learned from this unit, as well as the other climate of change units.

In their last reading assignment I asked them to tell me which activity (we had daily activities) they thought was their favorite of the semester. I received many thoughtful answers that I have extracted from their on-line submissions and will organize and post on the implementation web pages. InTeGrate units that were frequently mentioned included Climate of Change (units 1 and 2), Freshwater and Environmental Justice (unit 1and Love Canal), and A Growing Concern (unit 1).

The following are tabulations of how the students did on specific questions on the last exams. Note that I had 124 students in the class but I allow those students who are satisfied with their overall grade to not take the last exam (exam 7), thus the lower number (109 students). This does eliminate several of the students who already have A’s or B’s (and sometimes C’s) who are content with their grades from taking this exam. Exam 7 is like all previous exams (a mix of multiple choice, fill-in-the-blank and essay). Two of the essay questions were the GLE questions. Note that I also make multiple versions of the exam, sometimes with slightly different questions, to help eliminate cheating.

Exam 7 questions: (109 students answered questions unless otherwise noted)

All of the following are components of ENSO except: (39% correct)

1. sea surface temperature B) ozone layer C) jet stream D) upwelling E) tradewinds

In an ***El Niño*** year we expect to see \_\_\_\_\_\_\_\_ sea surface temperatures off \_\_\_\_\_\_\_\_. (70% correct out of 53 students)

1. higher, South America B) lower, South America C) higher, Antarctica D) lower, Europe

In an ***La Niña*** year we expect to see \_\_\_\_\_\_\_\_ sea surface temperatures off \_\_\_\_\_\_\_\_. (50% correct out of 56)

1. higher, South America B) lower, South America C) higher, Antarctica D) lower, Europe

An example of ***positive*** feedback is: (46% correct out of 26 students)

A) fresh snow reflects more sun, causing cooling B) dark ice absorbs sun, causing heating and melting

C) grasshoppers eating all crops and then dying D) installing metal a roof to reflect sunlight

An example of ***negative*** feedback is: (29% correct out of 83 students)

A) fresh snow reflects more sun, causing cooling B) dark ice absorbs sun, causing heating and melting

C) burning more fossil fuels to run air conditioners when it gets hot

D) greenhouse gases warm the atmosphere, causing warming of the ocean, releasing more CO2

The collapse of the Mayan civilization was likely due to: (79% correct)

1. extremely cold temperatures B) hurricanes C) glaciers D) floods E) droughts

The Vikings may have abandoned settlements in Greenland because: (91% correct)

A) they fought with the native population B) it got too wet C) they ran out of trees

D) all their animals died E) they could not adapt to harsh winters

What crop do people in the Andes grow that is sensitive to climate? (68% correct)

1. potatoes B) wheat C) beans D) corn E) cotton

ENSO can become part of the geologic record through (91% correct)

A) flooding that leaves behind sediment B) flooding that scours away sediment

C) drought-induced fires that leave behind burnt soils and sediments D) A and C E) no known means

The optional exam is 40 multiple choice questions from all 7 previous exams. This exam is given for students who want to improve their grade beyond exam 7. If they score higher on this exam than any previous exam, the optional exam replaces their lowest exam score. Only 90 students took this exam.

Optional exam questions: (90 students answered questions, unless otherwise noted)

An example of ***negative*** feedback is: (41% correct out of 63 students)

A) exponential growth of the rabbit population B) glaciers melting exposing dark land and causing more heating C) disease slowing the growth of the rabbit population D) a city building new parking lots on vacant land increasing runoff E) none of these

An example of ***positive*** feedback is: (30% correct out of 27 students)

A) heavy traffic on the freeway B) glaciers melting exposing dark land and causing more heating

C) disease slowing the growth of the rabbit population D) a city building new parks to decrease runoff

E) none of these

Which of the following mineral resources is used to make rechargeable batteries? (86% correct)

1. halide B) lithium C) mercury D) gold E) calcium

Which of the following is **NOT** an important component of a system: (79% correct)

A) inputs B) living and nonliving matter C) energy D) outputs E) all are important

***Naturally*** how does phosphorous end up in the soil? (30% correct)

1. dissolves from atmosphere B) from streams and lakes C) decay of animals D) weathering of rocks

In the ***phosphorous*** cycle \_\_\_\_\_\_\_\_\_ is/are a **flux.** (50% correct out of 54 students)

A) erosion B) pollution C) runoff D) soils E) all but D

Which of the following are **fluxes** in the water cycle? (83% correct out of 53 students)

A) precipitation B) atmosphere C) oceans D) evaporation E) A and D

*Natural* processes that take up ***carbon*** include: (37% correct)

A) burning coal B) photosynthesis C) volcanic eruptions, D) respiration E) all of above

Permeability refers to the ability of soil to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. (67% correct)

A) hold water B) remain clean C) allow water to pass through it D) hold nutrients E) become salty

The water level in the Ogallala aquifer is dropping primarily because of \_\_\_\_\_\_\_\_\_\_ use. (65% correct)

A) industrial B) agricultural C) land D) domestic E) petroleum

Feedback: (77% correct)

A) is a necessary component of systems B) can speed up a system C) never slows down a system D) exchanges energy E) all but C

An area of land that drains all the streams and rainfall to a common outlet, such as the ocean, is called a(n) \_\_\_\_\_ (56% correct)

A) confined aquifer B) drainage divide C) watershed D) artesian well E) water table

During an ***El Niño*** event the SST off South America is \_\_\_\_\_\_\_\_\_\_\_ and precipitation is \_\_\_\_\_: (68% correct out of 53 students)

A) warmer, higher B) warmer, lower C) colder, higher D) colder, lower

During a ***La Niña*** event the SST off South America is \_\_\_\_\_\_\_\_\_\_\_ and precipitation is \_\_\_\_\_: (27% correct out of 26 students)

A) warmer, higher B) warmer, lower C) colder, higher D) colder, lower

Which of the following are **sinks** in the water cycle? (25% correct out of 27 students)

A) precipitation B) atmosphere C) glaciers and ice caps D) evaporation E) A and D

In the ***nitrogen*** cycle \_\_\_\_\_\_\_\_\_ is/are a **source.** (54% correct out of 26 students)

A) nitrification B) pollution C) runoff D) atmosphere E) all but D