Active Learning Activity – TIPS Workshop Autumn 2014

Activity Name: Create a Problem

Course: Physics 121: Introductory Mechanics Course; Cap of 48 students that will move to 60 in Winter Quarter; Primarily Sophomores, but have a handful of Freshmen and some Juniors.

Learning Goals:

- Construct, re-construct, and add to understanding and application of mechanics concepts
- Be effective problem-solvers and develop different approaches to and representations of the material
- Develop as a learner-educator: take responsibility for – and be active in – own learning, assist others to do the same, and develop effective study skills

Learning Outcomes:

- Identify and analyze misconceptions of mechanics concepts previously held in order to modify them and build on correct knowledge
- Analyze and solve physics problems using an expert approach in order to identify main concepts, logically progress through problems, and increase confidence and use of symbolic manipulation

Bloom’s Taxonomy Level: Creation

Activity Description: In groups, students are expected to create a physics question for an exam. One question out of the pool of questions that satisfy the given requirements is then placed on the exam. The benefits of this activity are: students are operating at the highest level of Bloom’s Taxonomy, they have to know and study the material in class to be able to create a question, they have to figure out what information to provide in order for someone else to solve the problem, they get to contribute to the exam (this results in few to no complaints about the exam), they realize the difficulty in creating a question, it hopefully encourages students to study more for the exam as they have access to all viable problems, I have permission to choose a difficult question (students will frequently come up with questions that are more difficult than the ones I would write), and it engages all students (body language changes when I've done this activity, in addition to verbal engagement).

Activity Implementation: Students are given an entire class period – 80 minutes – to create, and try to solve, a problem. For my physics course, the following requirements are given to the students: they must solve for only one variable/quantity, they must use at least three equations to solve for the one variable/quantity, the problem should describe a real-life situation or it should be creative, and they can’t use a problem or example straight from their textbook, class, or the Internet. A problem-solving guideline also must be followed when the students solve the problem they created. Once these are turned in, I vet each one to make sure the problems both meet the requirements, and are solvable, i.e., contain enough information to actually solve. All of the viable problems are then typed onto individual PowerPoint slides with their answer, but not the solution, and posted as a PDF to the course Canvas site for review by the students prior to the exam.
Active Learning Activity – TIPS Workshop Autumn 2014

Activity Name: Find the Story in the Data

Courses: Teacher education math methods class, statistics classes, grad class on fostering reasoning with data and visualization. Seen it used in a 4th grade class and in a high school advanced algebra class.

Learning Goal: Gain skills in visualizing data

Learning Outcome: Create and revise a data visualization in order to tell a story using data

Bloom's Taxonomy Level: Creation

Activity Description: As a group, use Gapminder.org to choose data sets to explore and find a story in the data. The group must come to consensus on the data to display and the story to tell. Each group should produce a poster of their story. The poster should be complete in telling the story you found in your data. You must have at least one graphical and one numerical representation on your poster.

Activity Implementation:

Materials: poster paper, markers, Internet, and Gapminder.org

Gallery Walk:

There will be a gallery walk as each group rotates around the room and gives feedback to other groups on their poster on post-its. Attach post-it to the poster for the group to use in revisions. Teacher Check Point

Revisions:

Each group will have an opportunity to use the feedback from their classmates to revise their poster.

Gallery Walk #2:

Using the Traveler’s and Teller’s, we will utilize a second gallery walk with the new posters. One person in the group will be chosen at random to be the Teller. The rest of the group will be Travelers. The Teller will stay with their poster, explaining it to the other groups’ Travelers and answering questions. Groups will rotate every 5 minutes. When the Travelers get back to their Teller, they will have 15 minutes to explain the other groups’ posters. There will be a quiz during the next class period regarding the information found in the posters. Teacher Check Point

Homework:

Write a blog post about your reactions to 1) Gapminder, 2) your thoughts about the feedback from your peers during gallery walk 1, and 3) how you felt in your role as a traveler or teller.

Extension:

Research, using the internet, the actual underlying social causes for the story appearing in your data.
<table>
<thead>
<tr>
<th>Well Above Standard</th>
<th>Above Standard</th>
<th>At Standard</th>
<th>Below standard</th>
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</thead>
<tbody>
<tr>
<td>Gallery Walk #1 – Does the Poster Tell the Story</td>
<td></td>
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<tr>
<td>1. The poster stands on its own needing no additional explanation</td>
<td>The poster was complete with Title, sufficient clear and concise information to tell the story</td>
<td>The poster was missing minimal details which left gaps in the story but did not detract from the significant ideas</td>
<td>The poster displayed pertinent information but was incomplete in telling the story</td>
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<tr>
<td>2. The poster contains a complete graphical representation of the data</td>
<td>The graph was accurate and complete including Title and labels and conveyed important information which enhanced the story. The graph stood on its own</td>
<td>The graph was accurate and complete including Title and labels and conveyed information about the story but may not have added significantly to the other information given.</td>
<td>The graph was inaccurate</td>
</tr>
<tr>
<td>3. The poster contains a numerical representation of the data with an explanation of how it fits into the story</td>
<td>The numerical representation is accurate and the explanation is written in the context of the story and adds to the readers’ understanding of the story</td>
<td>The numerical representation is accurate but the explanation is written in “math” and not in the context of the story. The representation adds to the readers’ understanding of the story</td>
<td>The numerical representation is inaccurate or there is no explanation of how it contributes to the story</td>
</tr>
<tr>
<td>4. Neatness, Accuracy (spelling, etc) &amp; Creativity</td>
<td>The project is neat, well organized, accurate and displayed creatively</td>
<td>90% of the project is neat, well organized, accurate and displayed creatively</td>
<td>75% of the project is neat, well organized, accurate and displayed creatively</td>
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<table>
<thead>
<tr>
<th>Gallery Walk #2</th>
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<tbody>
<tr>
<td>1. The revised poster contains all the elements from Gallery Walk #1</td>
</tr>
<tr>
<td>All the elements above are now Well Above Standard</td>
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<tr>
<td>2. The teller is able to tell the story and answer questions with accuracy</td>
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<tr>
<td><strong>Blog Post</strong></td>
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Intercultural Literacy Development: My Journey

Assignment Topic
As part of the course work, you are required to attend at least one campus event or workshop to enhance your communication skills in English. This assignment is designed to help not only improve your communication abilities but also help you better understand US university life and culture. Choose one event, workshop, or campus resource that you’ve found most meaningful and helpful in terms of your academic enculturation process here at UWB (perhaps, not only for you but also for many international students). Then, make suggestions to the Chancellor of our campus about curricular and extra-curricular activities that you think should be organized or created in order to enhance the educational experience of international students on our campus.

Assignment Goals
- To cultivate an ability to write from personal experience, from readings, and from research
- To foster your active learning by utilizing campus resources and events
- To connect your curricular activities with extra-curricular activities
- To guide you to reflect on your academic literacy development
- To cultivate your critical thinking skills
- To enhance your ability to write according to the conventions of US academic writing
- To help you understand the concept of intercultural literacy

Logistics
* 4-5 pages (excluding the Works Cited page)
* Include the title of your essay (the title of your paper must capture the key idea of your paper)
* Standard 12-point font in Times New Roman with one-inch margins, double-spaced
* Include your name, the title of the assignment, my name, and due date

Source Requirement
* A minimum of four secondary sources (readings) should be cited in your essay according to either APA or MLA citation style (you can choose a citation system with which you are more familiar). You should use at least two sources from the class readings to strengthen your argument and two sources on your own.

Due Dates
* November 20 (Thursday): Bring your early draft for the first peer review
* November 23(Sunday): Upload the revised version of your essay on the course website by midnight

Evaluation Criteria
Here are the basic criteria I plan to use in evaluating this assignment. But we will discuss the criteria as part of our class activity today, and I will incorporate what we come up with into the evaluation criteria.

- Introduction & Thesis Statement Construction (3): Does the introduction clearly lay out the main point the paper will address? Does the paper have a clear thesis statement?
- Source use and synthesis (3): Is the author’s main point in the paper adequately supported by the sources? Are the sources well-integrated into the paper?
- Thesis development (4): Do the details and examples support the thesis of the paper? Is the focus of the essay clear?
- Organization (3): How are the ideas arranged? Do transitions between paragraphs flow? Are the paragraphs and sentences arranged in logical order?
- Conclusion (2): Does the paper end effectively? Does the paper summarize the key points of the paper and come to conclusions?
1. What is the “life history continuum”? Make a drawing using the following words (multiple times, if you like): High, Low, Fecundity, Survivorship.

2. Adult female salmon produce about 4000 eggs. Draw a line indicating where you would put salmon on the figure you just drew.

3. Draw a line indicating where you would expect a “K-selected” species to be.

4. In the figure at right, draw and distinguish survivorship curves you would expect to see in an r-selected versus a K-selected species when the environment is stable. Be sure to LABEL THE AXES!

5. Distinguish between additive and compensatory mortality.

6. Sea lions are often blamed for depressing runs of salmon. If sea lion predation was compensatory mortality, how would sea lion removal affect salmon populations? Explain.

7. Both sea lions and birds eat salmon. For a given fish that is eaten, for which act of predation (done by a bird or by a sea lion) is more likely to represent compensatory mortality? Explain with reference to survivorship curves.
8. Under the hood: Biology in Bloom.
You are not likely to care about teaching theory, but ... understanding the types of information we are discussing will help you identify how the information we discuss is interrelated, and will help you identify the important ideas in this and other courses. In your first day of any education theory course you are likely to hear about “Bloom’s taxonomy” – a framework for thinking about types if information and levels of thinking. The table below list Bloom’s levels on the left, and types of information/thinking on the right. Your task is to read the content on the right, and write the corresponding number next to the appropriate Bloom’s level on the left. Bloom’s level descriptions are taken from: http://www.nwlink.com/~donclark/hrd/bloom.html

<table>
<thead>
<tr>
<th>Bloom’s Level</th>
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<tr>
<td><strong>Knowledge:</strong></td>
<td>Recall data or information.</td>
</tr>
<tr>
<td><strong>Comprehension:</strong> Understand the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one’s own words.</td>
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<td><strong>Application:</strong></td>
<td>Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the workplace.</td>
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<tr>
<td><strong>Analysis:</strong></td>
<td>Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.</td>
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<tr>
<td><strong>Synthesis:</strong></td>
<td>Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.</td>
</tr>
<tr>
<td><strong>Evaluation:</strong></td>
<td>Make judgments about the value of ideas or materials.</td>
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</tbody>
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1. In order to know whether mortality is additive, one must know how it affects population size.
2. It is more important to focus on removing predatory sea lions than predatory birds.
3. Additive and compensatory mortality have different effects on population sizes, and I need to distinguish them to understand the impact of predation.
4. Mortality that occurs early in life is more likely to be compensatory mortality, particularly for species with steep life history curves (i.e. low survivorship).
5. Additive mortality is mortality that results in an equivalent reduction in population size.
6. To understand whether sea lions are really influencing salmon populations, I need to know whether or not sea lion predation represents additive mortality.

9. If you were an aposematically colored distasteful moth, would you rather be surrounded by Batesian mimics or Mullerian mimics? Explain.