SYMPOSIUM ON LEARNING ANALYTICS AT MICHIGAN

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Damn These Data!
The More I Know About Student Effort
The Less I Understand Student Outcomes

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Driving Questions

1. How can I, as an instructor, increase student engagement?

2. How does a switch from traditional to hybrid lecture format affect engagement and learning?

3. What signals exist that identify students at risk of failure earlier?

...and to what degree does this affect student learning?
The Student Learning Environment

- Homework
- Lab/Discussion
- Textbook
- Note-taking
- Lecture
- Student Response
- Student Inquiry/Discussion
How Students Prepare for Exams

- Lecture
- Note-taking
- Student Inquiry/Discussion
- Student Response
- Assessment
- Homework
- Lab/Discussion
- Textbook
New tools for teaching and learning

I’m confused!
Normally, our atmosphere is a sheltering and stable environment that has sustained and nurtured life for millions of years. It protects us from the bitter cold of space and from most of the sun's dangerous radiant energy. Its gases trap a portion of the radiant energy emitted by the earth, and this energy warms the lower atmosphere. Precipitation that falls over large areas helps support a wide variety of life, which over time, has adapted to the normal range of weather and climate we find on earth.

Over most of the earth, the atmosphere is quiescent, with a mix of blue skies and white clouds enveloping the globe. However, there are times when the sky turns ominous and the power of the atmosphere becomes focused on specific areas in events of wild fury that often last for short periods of time. These days of extreme and unusual weather are the focus of public fears, and are often the impetus behind our quest for knowledge about the atmosphere. While atmospheric scientists must understand the processes that govern the atmosphere even on the relatively quiet days, it is the ability to forecast the extreme and unusual weather events that ultimately prove the greatest challenge, as well as the greatest value, to society. It is these extreme weather events that attract the largest portion of our attention.

**Threats from the Sky**

Extreme and severe weather captures our imagination because of its sheer power and potential to cause personal injury, destruction, and death. In the United States, the risk of death due to a weather event is relatively small (about two per million people) when compared to other risks. Violent weather, however, deserves and demands study because it delivers its damage both unexpectedly and in catastrophic ways.

Even though the risk of losing one's life due to a weather event is low, such deaths, and the fact that weather-related events cause an estimated $10 billion
New tools for teaching and learning

- Publish Lecture
- Import PowerPoint or Keynote Slides
- Create Activities
- Add Videos
- Pick a Course
- Navigate Lectures
New Methods for Student Assessment/Feedback

- **Image Quizzes**: Where would you expect the ligament to tear?
- **Free Response**: Defend your previous answer.
- **Ordered Lists**: Rank these environments from greatest to least species.
  - Ordered
  - List
  - Question
What is the future of the sovereign state?

A. States will remain the sole, dominant form of political organization in the world.

B. States will choose to allow international institutions to grow to help them cooperate on economic and environmental issues.

C. Terrorism and international economic competition will lead states to create new barriers between them.

D. Globalization will limit state sovereignty as national economies integrate and people become transnational.

E. World government will be created through the spread of global governance.

71 of 285 (25%)
New Methods for Student Assessment/Feedback

Name one thing that is similar and one thing that is different between tendons and ligaments

80 responses

similar: both consist of fibrocartilage different: tendon --> mostly of collagen ligament --> more elastin

Both tendons and ligaments are dense regular connective tissue. However, ligaments contain more elastin fibers than tendons.

ligaments connect bone to bone, while tendons connect muscle to bone. both of them are help you move

similar: they attach things different: what they attach together and their structures

tendons attach to muscle and ligaments do not

tendons are made of more collagen and ligaments are made of more elastin

They are made of the same material. But they both have different structures.

collagen in tendons vs. elastin in ligaments

tendons are muscle to bone ligaments are bone to bone

similar--both attach to bone difference-- ligaments do not attach to muscle

Ligaments are more elastic than tendons. Both are used to keep bones in place/secure.

Both connect to bone Ligaments are more elastic like

they are both connective tissues. ligaments connect bones to bones while tendons connect bones to muscles

Ligaments attach bone to bone, where as tendons attach muscle to bone.

they both have transitions. their function is different

They are both connective tissues Ligaments are more stretchy

tendons bind muscle to bone, while ligaments bind bone to bone

Similarity-- Both made from fibroblasts Difference-- Ligaments are bone to bone tendons are bone to muscle

Tendons and Ligaments both attach to bone Ligaments do not attach to muscles and Tendons do.

To text in your answer send '44857 [your answer]' to (734) 666-0094

80 of 137 (58%)
New Methods for Student Assessment/Feedback

Where would you expect the greatest storm surge?

117 of 237 (49%)
Euler Integral for positive integers $n,m$:

$$B(n, m) = \frac{(n - 1)! (m - 1)!}{(n + m - 1)!} = \frac{n + m}{nm \left( \frac{n + m}{n} \right)}$$
eTextbooks

Click on the link to the assignment to open up a view of the questions. Click on the "Edit" (pencil) to edit an assignment. Click on the "Answer Key" (key) button to view the answer key. Click on the "Delete" (x) to delete an assignment.
Choose the statement that best describes your instructor's use of the assigned textbook

- The instructor treats the book as reference, you can do very well in the class without reading the book.
- You can get by in the class without reading the book.
- The instructor uses the book extensively, you must read it to do the required work.
- Other

Source: SI 622 Winter 2012, Chuan-Che Huang, Yu-Jen Lin Cristina Moisa, Jeff Schwarz
REQUIRED Homework Assignment
Due: 3/29/2012 at 08:00 am

Question 6 (Chapter 13)

Time to Relief – Medical researchers carried out an experiment to compare two headache treatments (1 = standard, 2 = new). A random sample of 20 headache sufferers met the protocol and were approved for the experiment. These 20 patients were randomly allocated to one or the other treatment group. When the next headache occurred, the patient took their treatment and recorded the time to relief (in minutes), where time to relief was operationally defined and related to cessation of throbbing. The researchers would like to assess if the new treatment brings relief more quickly on average as compared to the standard treatment using a 5% level of significance. The following descriptive statistics are provided.

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<tr>
<th>Treatment</th>
<th>Sample size</th>
<th>Mean</th>
<th>Standard Deviation</th>
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<tr>
<td>1 = Standard</td>
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<td>33.6 minutes</td>
<td>6.3 minutes</td>
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<tr>
<td>2 = New</td>
<td>10</td>
<td>26.1 minutes</td>
<td>2.3 minutes</td>
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(a) Let \( \mu_i \) represent the mean time to relief for the population of all patients who will receive the \( i \)th treatment \( (i = 1 \text{ for the standard treatment, } i = 2 \text{ for the new treatment}) \). State the appropriate hypotheses to be tested in terms of these parameters. Remember the response is time to relief and it is better to feel relief more quickly. (1 pts)

(b) The summary report contained the following statement:
The relief time measurements for the patients taking the standard treatment were much more variable than the relief times for the patients taking the new treatment. What descriptive statistics provided that insight? (Include the numerical values) (0.5 pts)

(CLICK TO ENTER ANSWER)
Does anything else matter?

Learning Analytics

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Number Correct • Number Answered • Comprehension • Questions Asked • Attendance
Design Goals

1. What data are important measures for learning, motivation & engagement?

2. Who is the audience?
   - Students (pull –or- push?)
   - Instructors
   - Advisors
   - Administration(!)

3. What options are desired for the presentation of these data?
GPA vs. 1st Exam Grade

Pass/Fail Students
Self Improvement
What is it that students know?
Self Assessment of Preparation

Before taking the exam, I felt highly prepared for this exam.
Self Assessment vs. Reality
Does “Preparation” include attending class?
Self Assessment vs. Reality

Does “Preparation” include asking questions?

Before taking the exam, I felt highly prepared for this exam.
Student Preparation

Q: “What is your best estimate for the number of hours you spent studying for this class in the past week?”
Student Motivation

Students receiving <60% on 1st exam
Diagnosing the Assessment

- much more difficult than I expected.
- more difficult than I expected.
- about the level of difficulty I expected.
- easier than I expected.
- much easier than I expected.
Student Preparation

Q: “How often do you make outlines while reading?”

Q: “How often do you underline or highlight while reading?”

Q: “How often do you use flashcards to test yourself?”

Q: “How often do you study with friends?”
Student Preparation

Q: “How often did you create review sheets for your studies?”

![Bar chart showing the relationship between review sheet creation frequency and 2nd Exam Grade.](chart.png)
Student Preparation

Q: "I enjoy humanities classes"

Q: "I enjoy social sciences courses"

Q: "I enjoy natural science classes"

Q: "I enjoy creative arts courses"
Student Preparation

“I feel that emotional issues have reduced my performance this semester”

“I feel that physical issues have reduced my performance this semester”
Student Preparation

Q: “How often did you review questions in LectureBook?”

![Bar chart showing the relationship between review frequency and 2nd Exam Grade.](chart.png)
Question 1 (Chapter 11)  

The Freshman 15 is the name of a common belief that college students, particularly women, gain an average of 15 pounds during their first year of college. A study of 31 female first-year college students resulted in a 95% confidence interval for the population mean weight gain for all female first-year college students of (-1.84 pounds, 13.04 pounds).

a. Using just the confidence interval, at a 5% significance level, is it reasonable to conclude that first-year college women do in fact gain 15 pounds on average? Briefly explain why or why not.

Answer: No, it is not reasonable to conclude that first-year college women do in fact gain 15 pounds on average as the value of 15 is not in the 95% confidence interval for the population mean difference.

Student: No, because 15 pounds does not fall in our 95% confidence interval, so it is not reasonable.

(+ Add Feedback)

b. True or False?

About 95% of the female first-year college students will have a weight gain in the range -1.84 to 13.04 pounds.

1. True
2. False
Evidence of Effect

Integrating homework with eTextbook

- **F09**: average grade = 3.09 (n = 1326)
- **F10**: average grade = 3.22 (n = 1395)

Online HW Tool + eText only new innovation incorporated.

- **Buy-In**: ~ 25% F10 and > 50% W11

Student Preparation

“I often feel so unmotivated when I study that I quit before I finish what I planned to do.”
What matters?

• **Possible Cause/Effect**
  - Motivation.
  - Practice with representative problems.

• **Unclear Cause/Effect**
  - Class attendance
  - Use of textbooks
  - Participation in student response activities
  - Flashcards/highlighting/annotations
  - Note-taking
1. Development of API’s
2. Definition of data structure
3. Protocols for maintaining anonymity.
4. Terms of use
5. IRB issues