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for more information see: http://open.umich.edu/wiki/AttributionPolicy

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Melo3Ds

Presentation to LSA-ITC:

Enhancing Undergraduate Education Through the Deployment of Quality Learning Objects

2/3/12

Brenda Gunderson and Nancy Kerner

University of Michigan at Ann Arbor

The Goal

To **improve education** by **integrating quality** cross-discipline and course-specific **Learning Objects** (**LOs**) into undergraduate courses

- **Learning Resources**

Any web-based teaching tool (e.g., tutorial, collection, ….)

Learning Objects (LOs)

Interactive web resources that lead students to learning goals via informed pedagogy

- **Learning Resources**

  Any web-based teaching tool (e.g., tutorial, collection, ….)

- **Learning Objects (LOs)**

  Interactive web resources that lead students to learning goals via informed pedagogy

The Proposed Solution

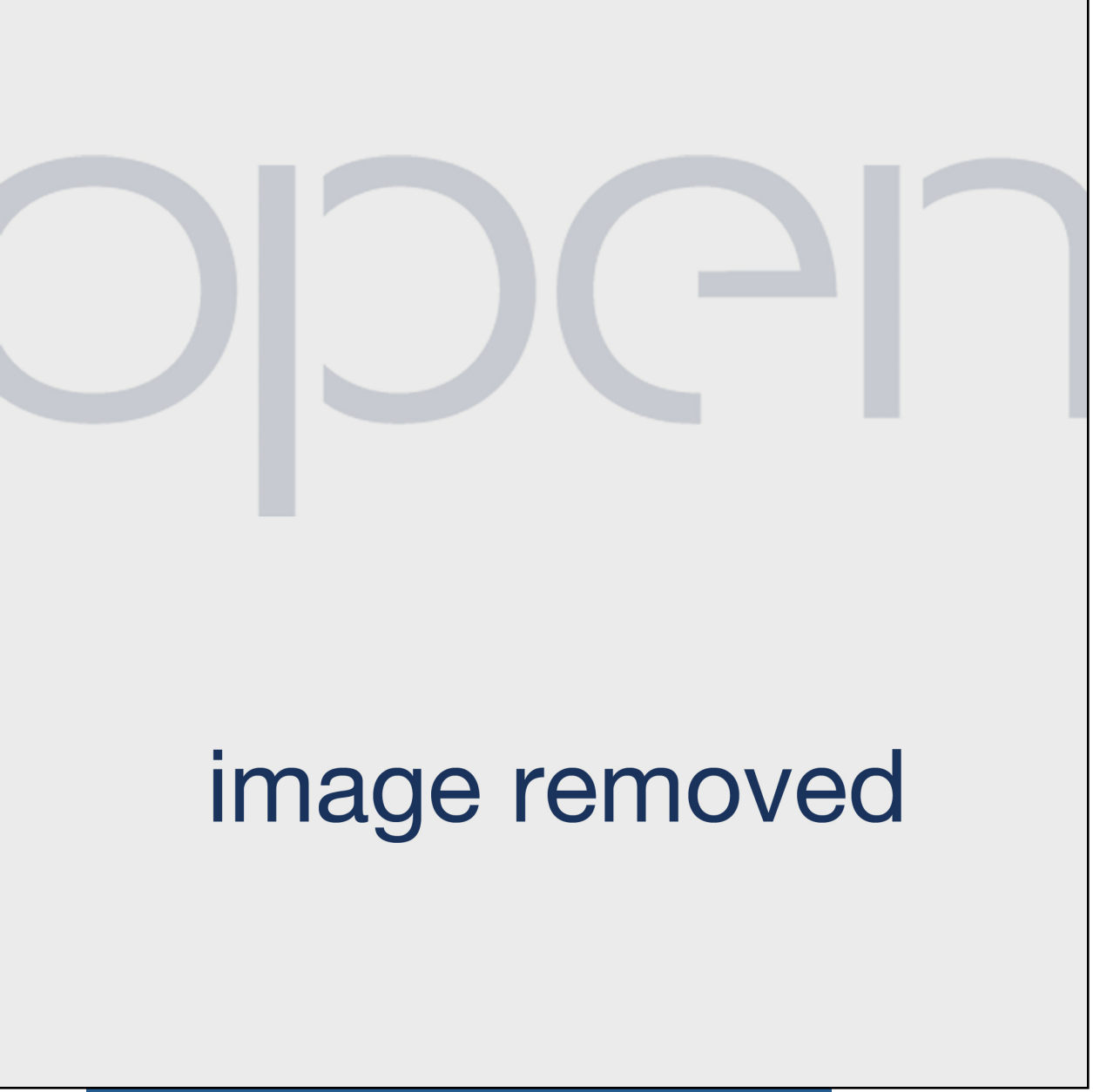
The Project

Enhancing Undergraduate Education Through the Deployment of Quality Learning Objects

Funding

NINI Grant (New Initiatives/New Infrastructure)

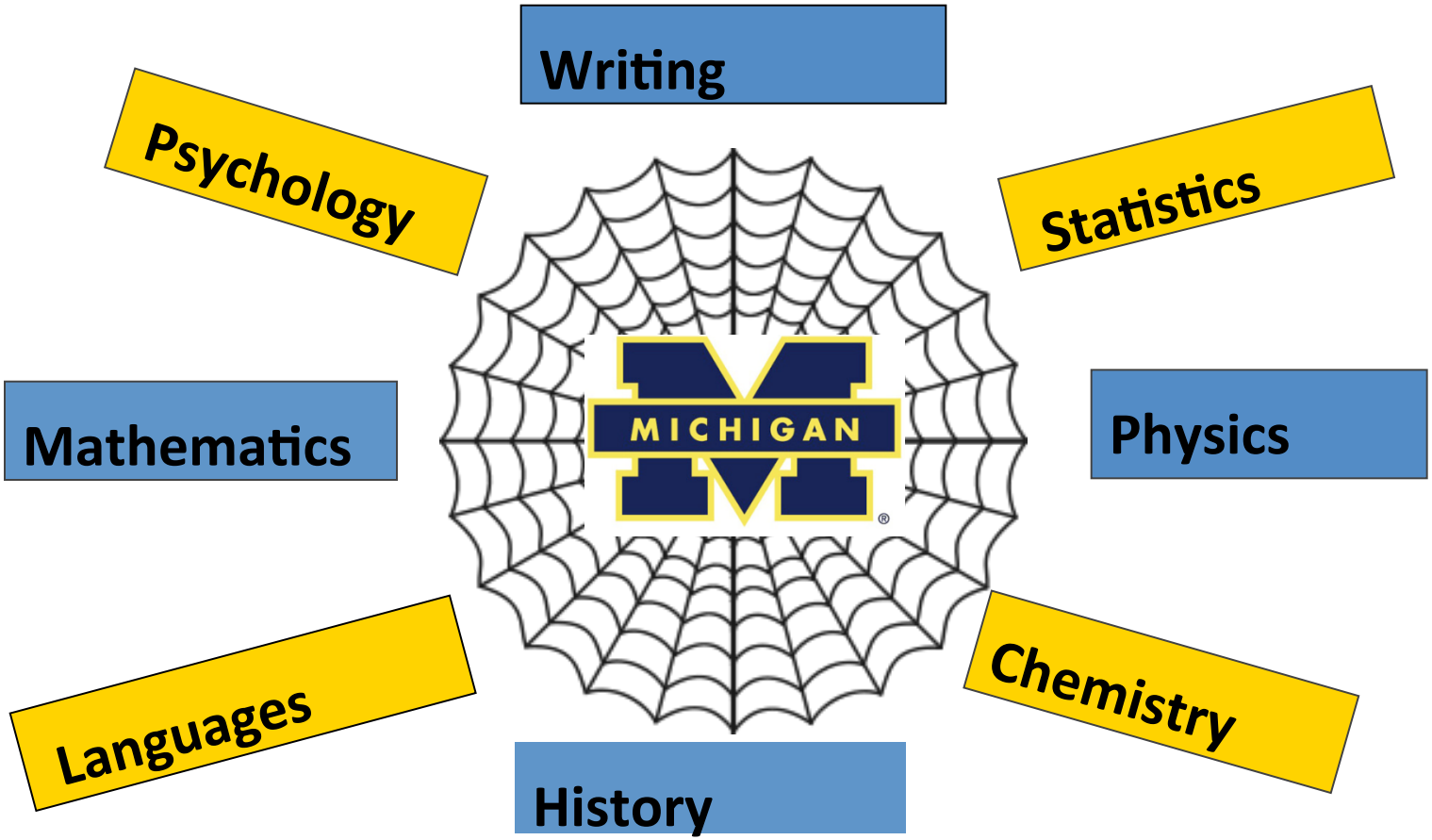
from UM LSA-ITC (Instructional Tech Committee)



Academic Gateway

UNIVERSITY OF MICHIGAN

MELO Gateway Courses



Total Enrollment = ~ 15,000 students/year

The MELO SOLUTION

- **Educate graduate students** across disciplines

  to access, evaluate, design LOs;

  and to create quality course-specific

  and cross-discipline LO collections.
- Graduate students **disseminate these**

  LO collections and designed LOs

  to relevant faculty for integration

  into undergraduate courses

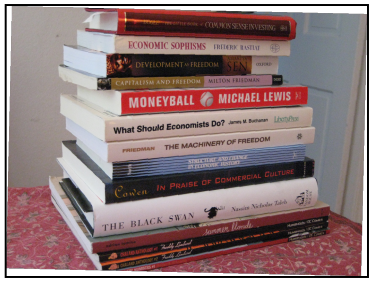
→ **The trainee becomes the trainer**

See "Bottom Up Faculty Development" at

http://conference.merlot.org/2009/Sat_Program.html

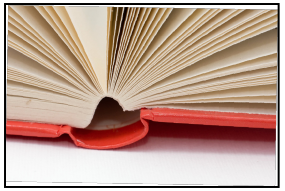
The Outcomes

- **LO course collection**
  - Selection based on course needs and goals
  - Provided within syllabus or on website



muppetspanker, My Unread Pile of Books, Flickr

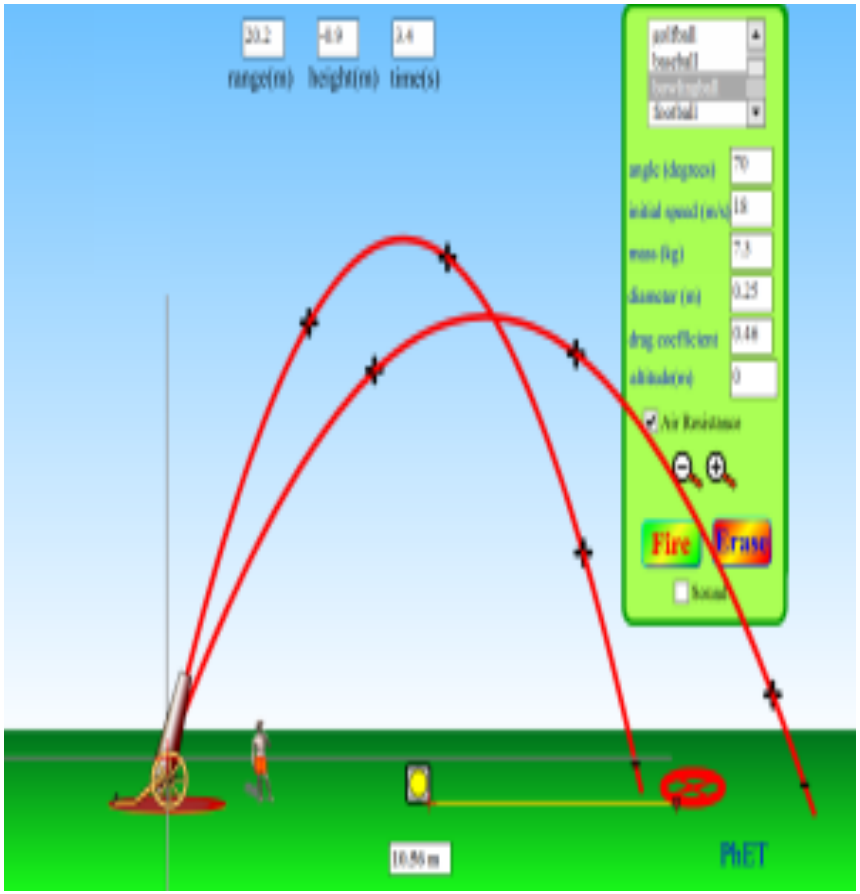
- **LOs tagged for course integration**
  - Choice based on **needs vs type** of LO
  - Choice focused on LOs that address **difficult concepts or skills**



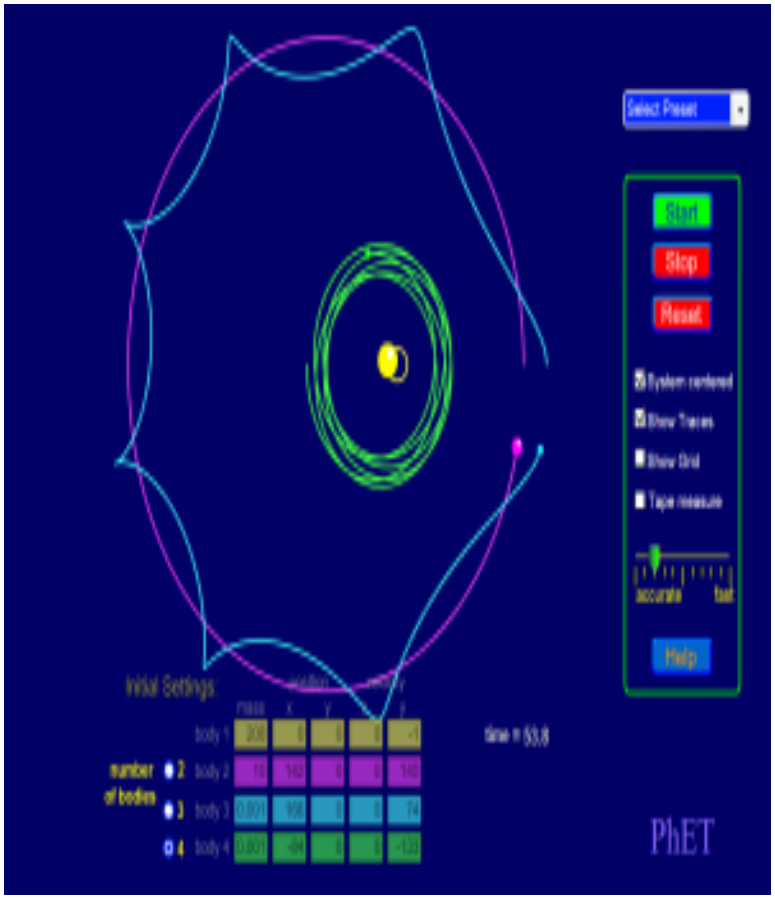
Horia Varlan, "Hardcover book gutter and pages", Flickr

The Outcomes

Select and Integrate LOs (Physics)



© FAIR USE



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Chosen Java Applets ≅ Games = LOs

The Outcomes

Interdisciplinary LO Collection

Matthew Wynn, Lightbulb!

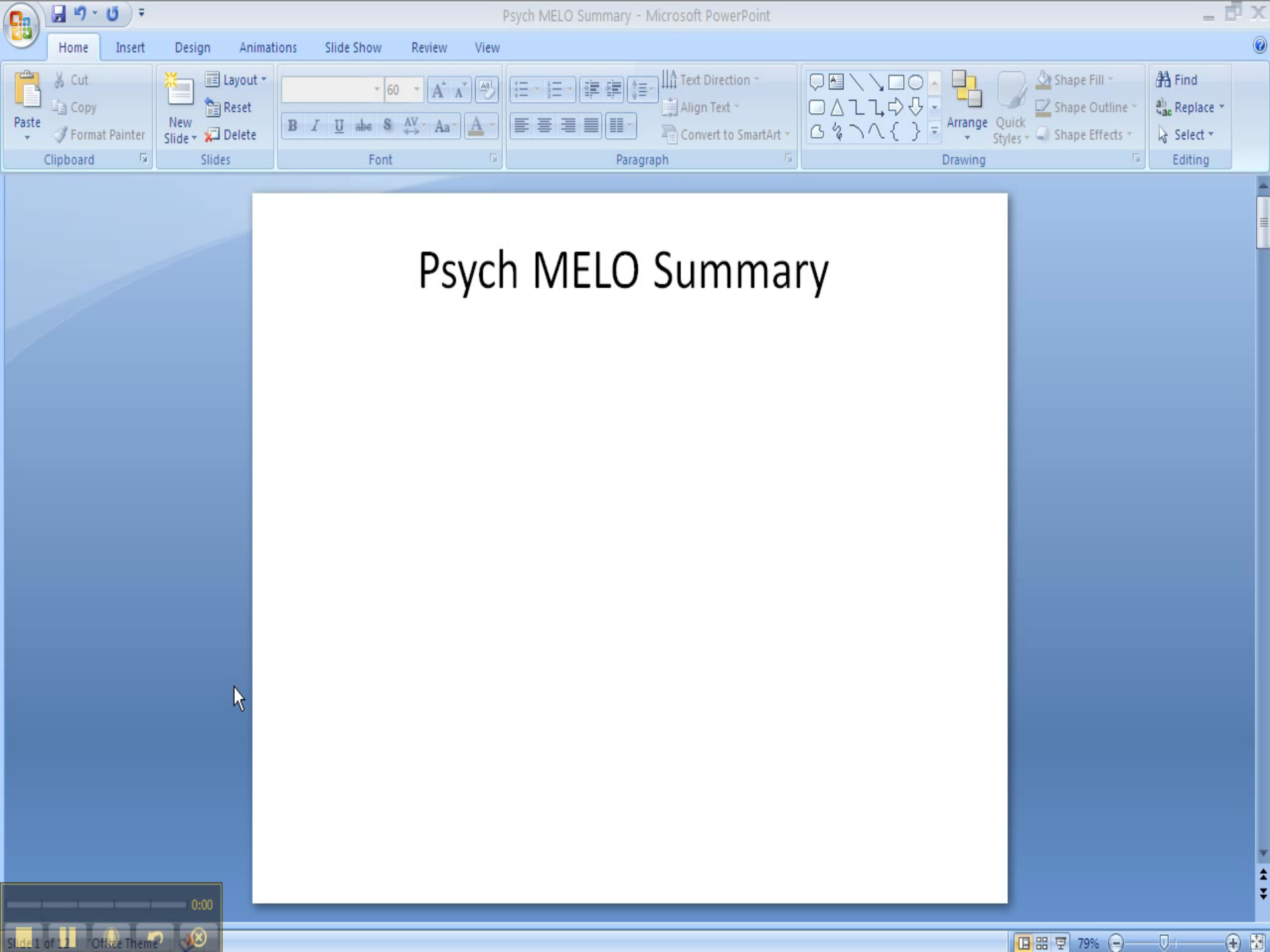
- Undergraduate students have different levels of academic training

- Success in undergraduate education demands a solid foundation in a variety of basic academic skills

Examples:

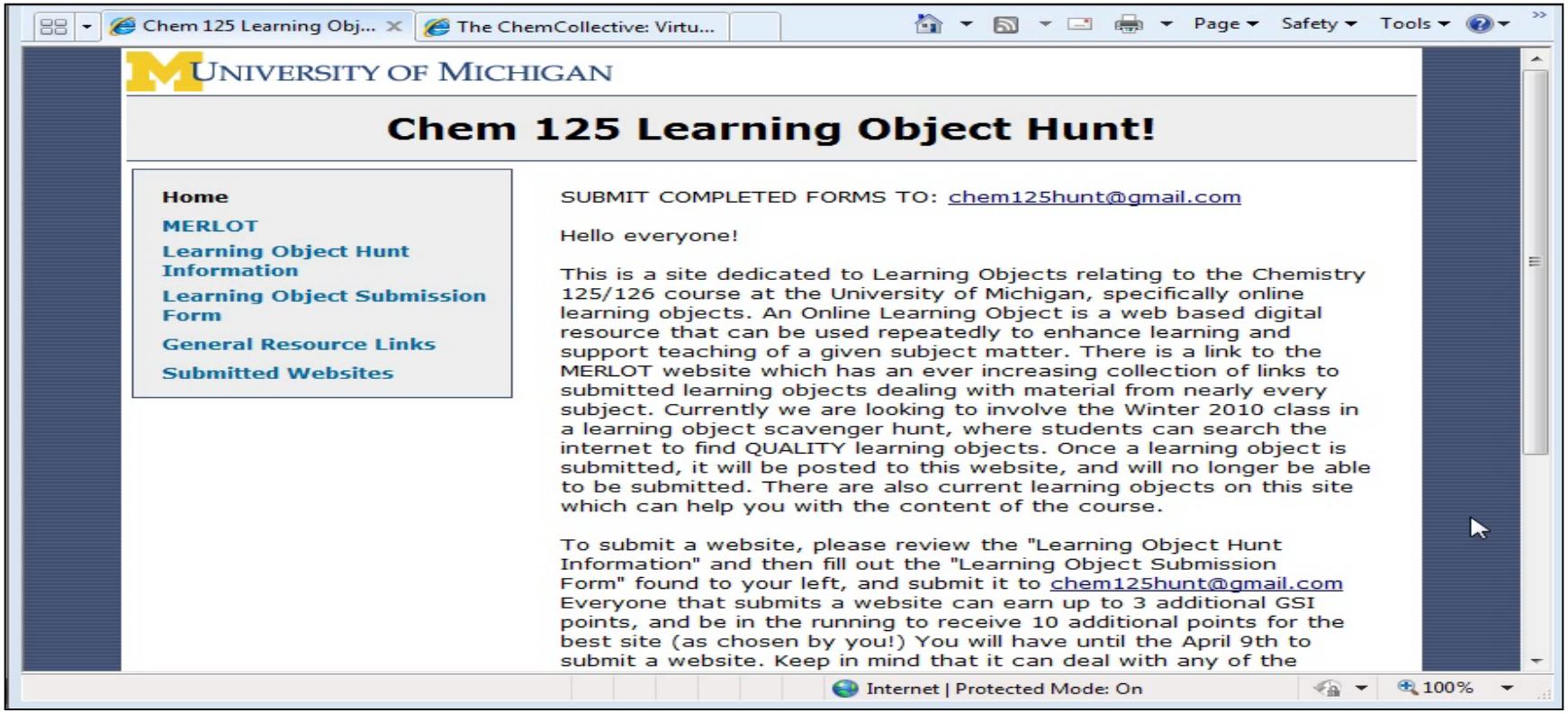
Writing skills
Working in Groups
Presentation skills
Study skills

- How can we work towards leveling the playing field?


Psych MELO Summary - Microsoft PowerPoint
Home
Insert
Design
Animations
Slide Show
Review
View
Paste
Cut
Copy
Format Painter
Clipboard
New Slide
Layout
Reset
Delete
Slides
60
Font
Text Direction
Align Text
Convert to SmartArt
Paragraph
Arrange
Quick Styles
Shape Fill
Shape Outline
Shape Effects
Drawing
Find
Replace
Select
Editing
Psych MELO Summary
0:00
Slide 1 of 1
"Office Theme"
79%

The **Outcomes**

Innovative LO Collection Building



- Students submit ~ 100 LOs with reviews and recommendations for course implementation
- Students voluntarily author LOs!

The Outcomes

Integration of LOs into Pre-labs (Chem)

E1 Pre-Laboratory Report (page 1/1)

Name: _____ Team #: _____ Date: _____ Section: _____

View the website http://preparatorychemistry.com/Bishop_Elem_Prop_frames.htm (Chapter 4 animations) and complete Table 1 below before answering pre-lab questions 1 - 3. Use the *CRC Handbook* in the SLC or online at http://www.lib.umich.edu/ to record the solubility data in Table 1. Click "Find Databases" and enter CRC Handbook of Chemistry and Physics. Click on Section 4 of the *Handbook*: Properties of the Elements and Inorganic Compounds and expand this to Physical constants of Inorganic compounds.

Table 1. Solubility of Ionic Compounds

Cation	Anion	Compound	Solubility ($g/100g\ H_2O$)
Ca^{2+}	NO_3^-	$Ca(NO_3)_2$	
Ca^{2+}	CO_3^{2-}	$CaCO_3$	
Na^+	NO_3^-	$NaNO_3$	
Na^+	CO_3^{2-}	Na_2CO_3	

1. How do cations and anions such as Na^+ and NO_3^- remain separated (dissociated) from each other in the presence of water?

2. What solubility generalizations can be made about ionic compounds, if both the cation and anion are singly or multiply charged based on the Table 1 solubility data?

3 – 4. Aqueous solutions of Table 1 compounds are mixed and a precipitate forms:
$Ca(NO_3)_2$ + Na_2CO_3 → precipitate

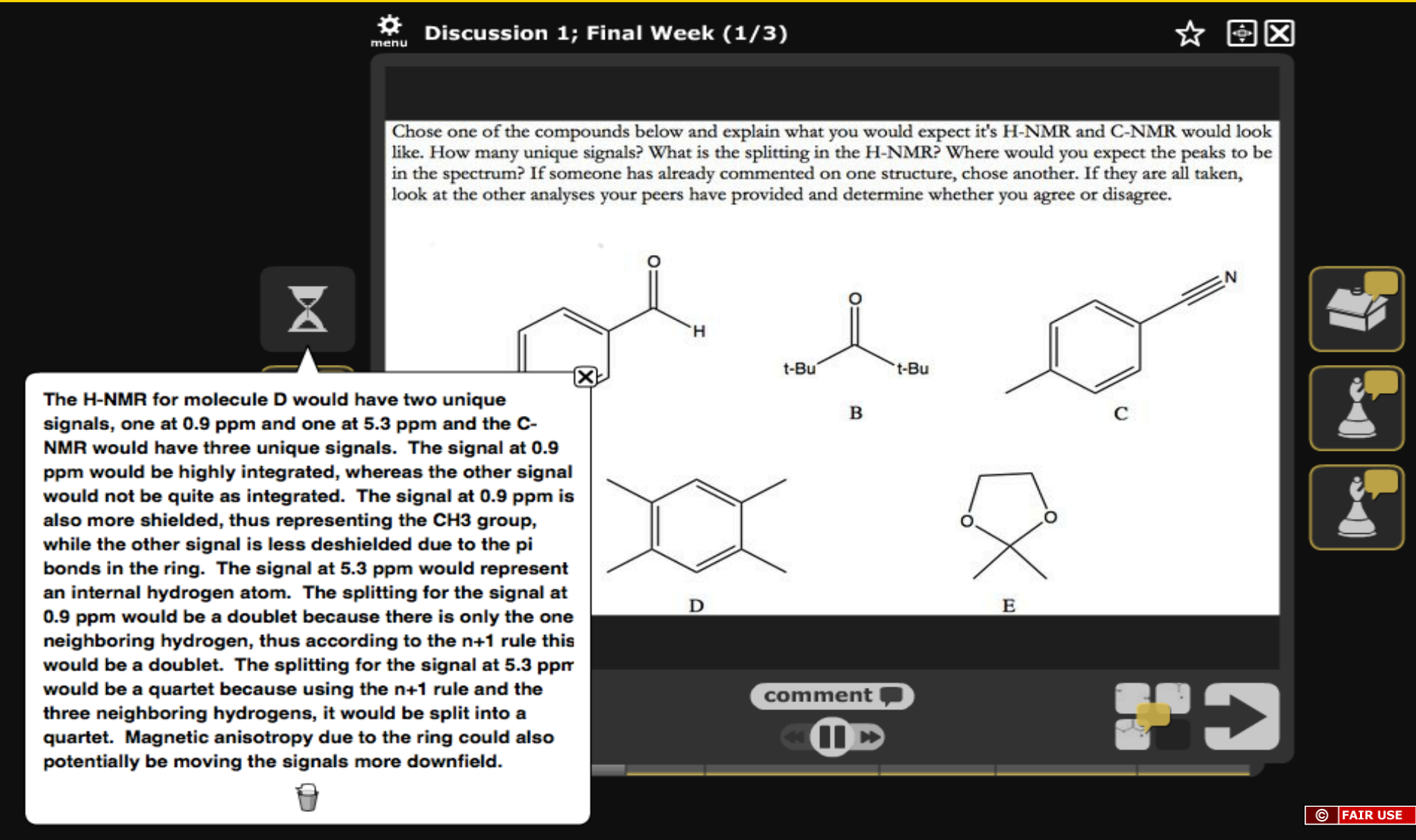
3. Identify and record the new combination of ions possible after mixing of $Ca(NO_3)_2$ and Na_2CO_3 _____

Based on the solubility data in Table 1, what is the likely identity of the precipitate?
_____ Why?

4. What do the test results below tell you about the precipitate formed in the reaction of $Ca(NO_3)_2$ and Na_2CO_3?
Test: $Ca(NO_3)_2$ + $NaNO_3$ → no reaction

The Outcomes

Online LO Pre-Labs with VoiceThread (Org chem)



The Outcomes

Online LO Pre-labs with Voice Thread (Org chem)

Ctools Analytics:

Average of 230 LO views a week

Only 48 students have access

VoiceThread:

For the last week in lab:

Discussion 1: 119 views, 16 comments

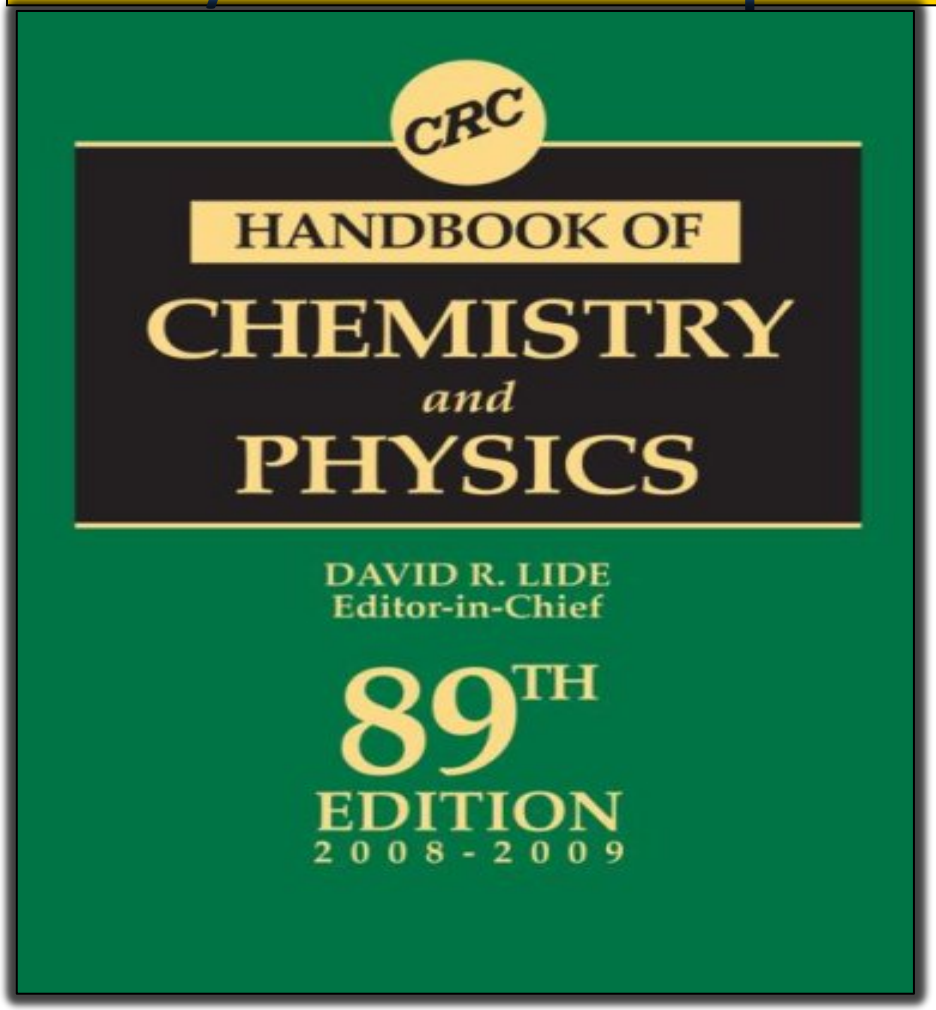
Discussion 2: 72 views, 17 comments

Discussion 3: 91 views, 15 comments

Students are visiting the site **multiple times**!

The Outcomes

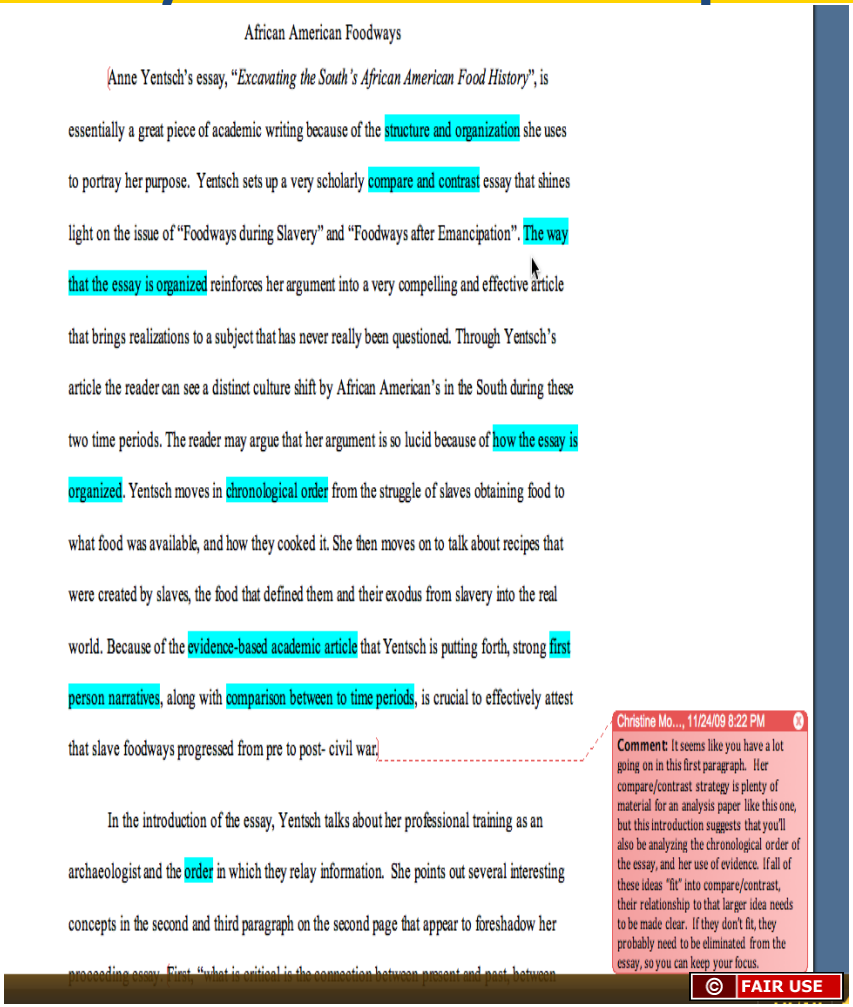
Video/Audio Screen Capture (Chemistry)



- **Screen captured resource tutorials**

The Outcomes

Video/Audio Screen Capture (Writing)



- **Video captured feedback for written documents**
  - personalized feedback on student papers.

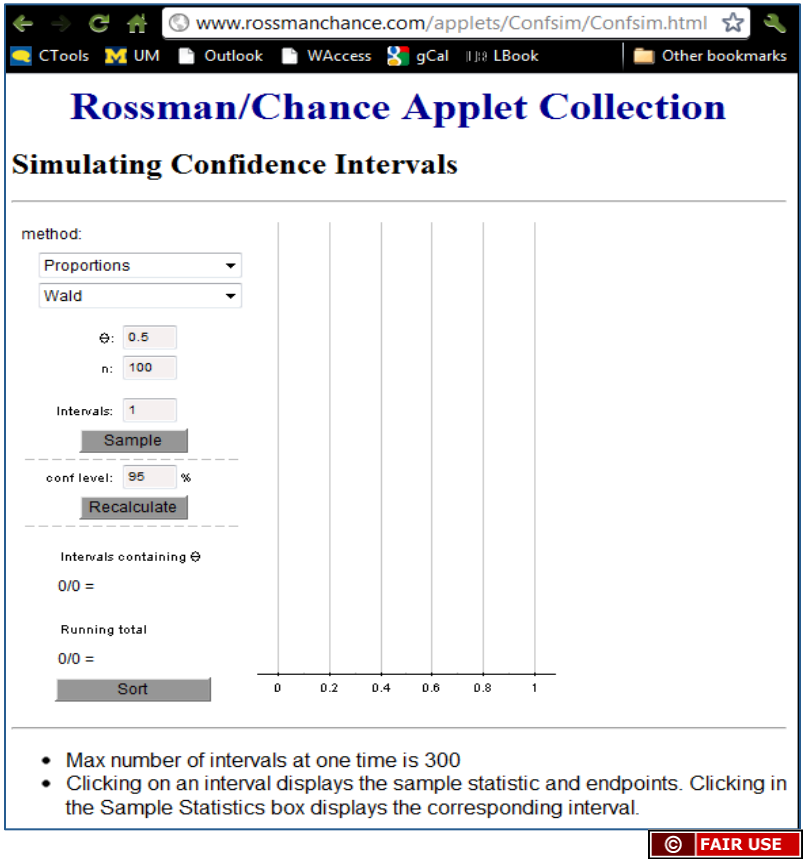
- **Screen captured tutorials**
  - how to construct a concept map for writing

http://www.screencast.com/users/cmodey/folders/Jing/media/8bd96754-d693-4b5e-ba59-952afb2f2e4d

The Outcomes

Video/Audio Wrapping of Imperfect LOs

- Simulating Confidence Intervals
- Authors: Beth Chance, Allan Rossman (CP)



http://www.rossmanchance.com/applets/Confsim/Confsim.html

Advantages of LO?

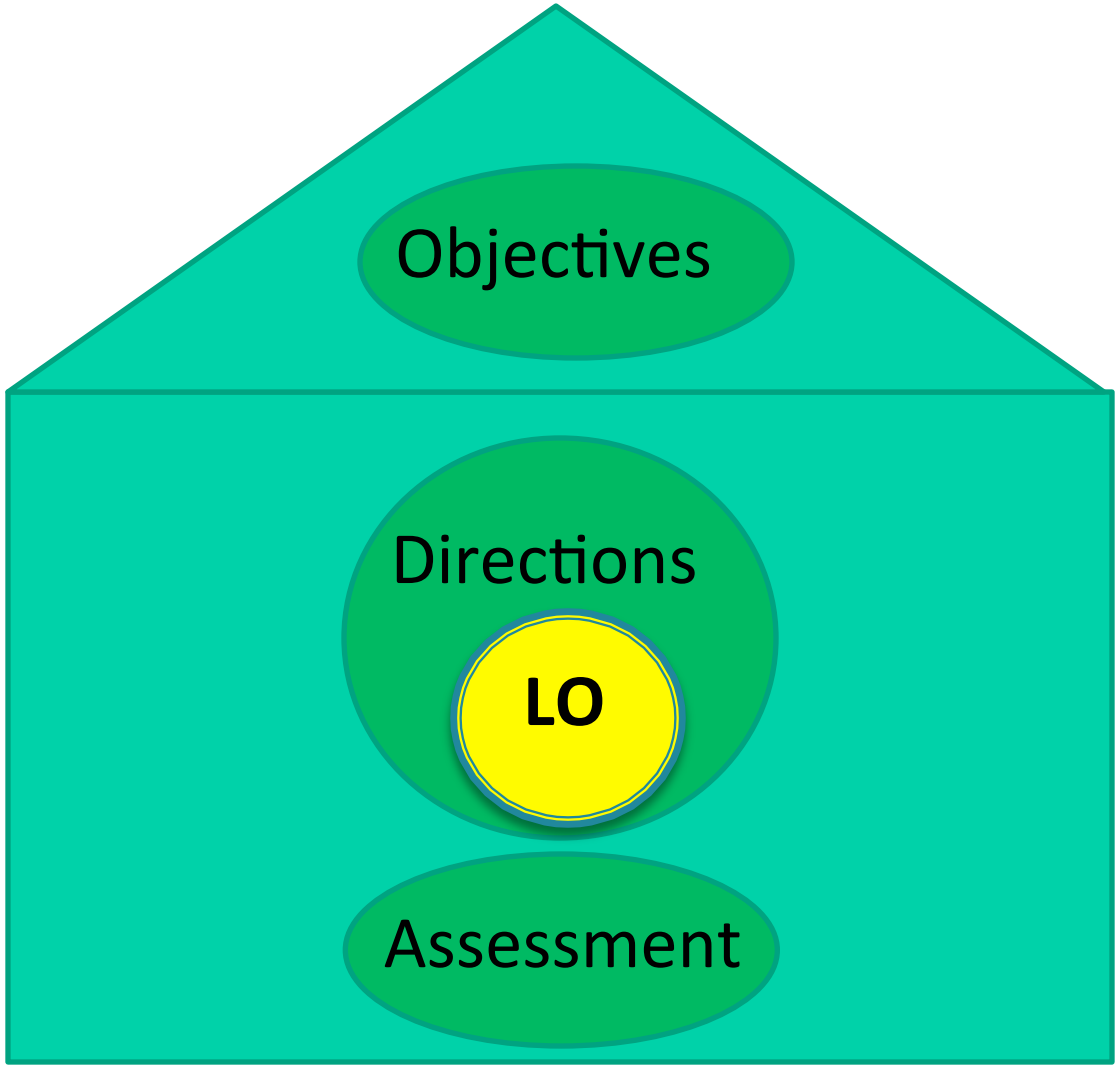
- Addresses fundamental concept.
- Provides excellent visual demonstration.
- User can adjust controls.

Disadvantages of LO?

- Learning Objectives?
- Directions?
- Terminology/Notation unknown to our students

Instead of:

My students will see:



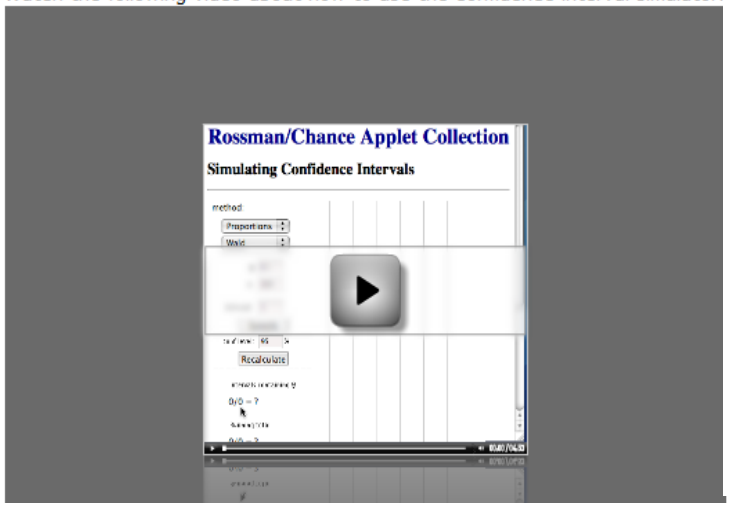
The Fully Wrapped LO = PreLab 03

Lesson03:

In this lesson, you will generate confidence intervals for estimating a population proportion. You will be able to set the value of the (usually unknown) population proportion, the sample size, and the confidence level. You also are able to decide how many samples will be generated and a confidence interval based on each sample will be computed and displayed. The applet graphs the intervals and those which did contain the true proportion are shown in green, while the intervals that did not contain the true proportion are in red. The true proportion is shown by a blue line on the graph. Trying different settings will allow you to make comparisons and draw some important conclusions about how confidence intervals work.

Lesson:

Watch the following video about how to use the confidence interval simulator.



Simulation Link:

The simulation may be found here.

Assignment:

Check Ctools for due date and submission details.

For each of the questions below, use the applet to help you address the question. **Submit your 1-2 sentence summary for each question directly inline to your GSI Ctools site Assignment for prelab3 (or as instructed on your class Ctools site).**

1 - Set the confidence level to 99% and the sample size to 100.
(a) What is the long run proportion of confidence intervals that contain the population proportion?
(b) Does this long run proportion depend on the sample size *n*? (Try some other sample sizes keeping the confidence level at 99%)

2 - What happens to the length of the confidence intervals as the confidence level increases? Compare some intervals at the 90%, the 95%, the 99% confidence levels (keeping the population proportion and the sample size *n* the same).

3 - What happens to the length of the confidence intervals as the sample size increases? Compare some intervals made using samples sizes of $n = 30$, $n = 50$, and $n = 100$ (keeping the population proportion and the confidence level the same).

The Outcomes

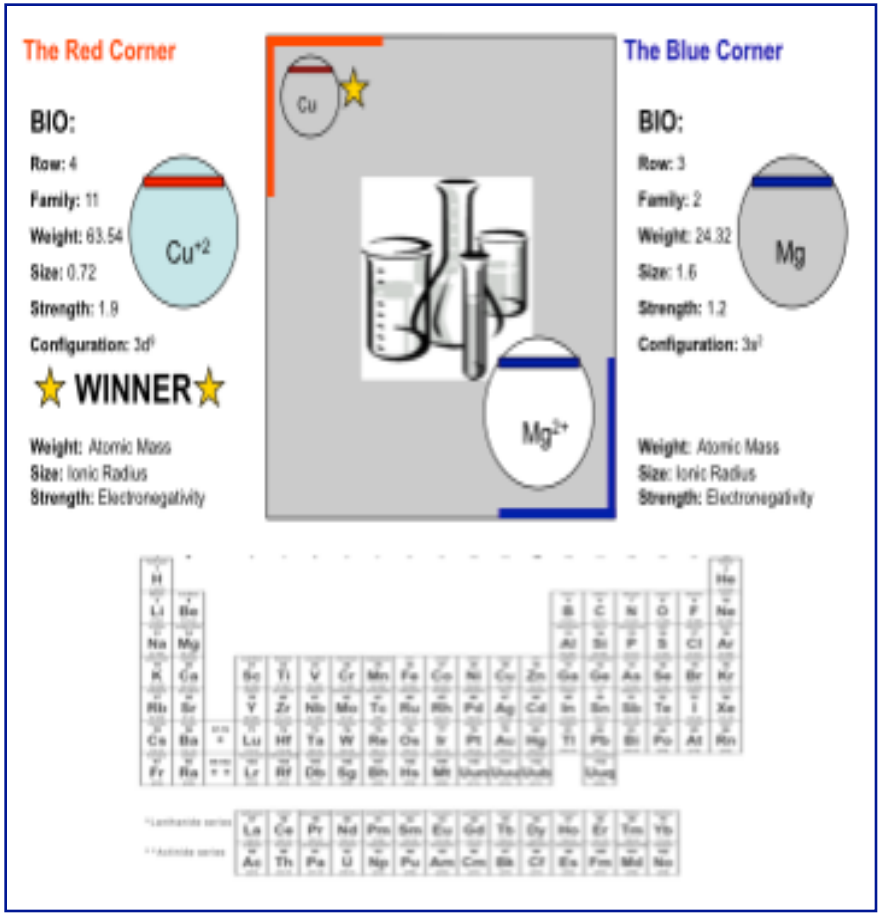
Innovative LO Designs

A New Interactive and Entertaining Redox Applet

Chemistry Cage Match:

The Battle For The Electron

Learning Objective: To understand the principles of Redox in terms of a variety of chemical properties



The Outcomes: LOs Created

Name That Scenario

This site gives you a chance to practice recognizing the appropriate situations in which to apply various statistical procedures. You will be presented with a series of ten real world statistics scenarios. Your task is to select the most appropriate statistical procedure for each scenario.

DIRECTIONS

1. Select at least two of the following Procedures.

2. Choose "First Scenario" to begin.

One Proportion

Two Proportions

One Mean

Paired

Independent T-test

ANOVA

Regression

Chi-sq Goodness of Fit

Chi-sq Homogeneity

Chi-sq Independence

First Scenario

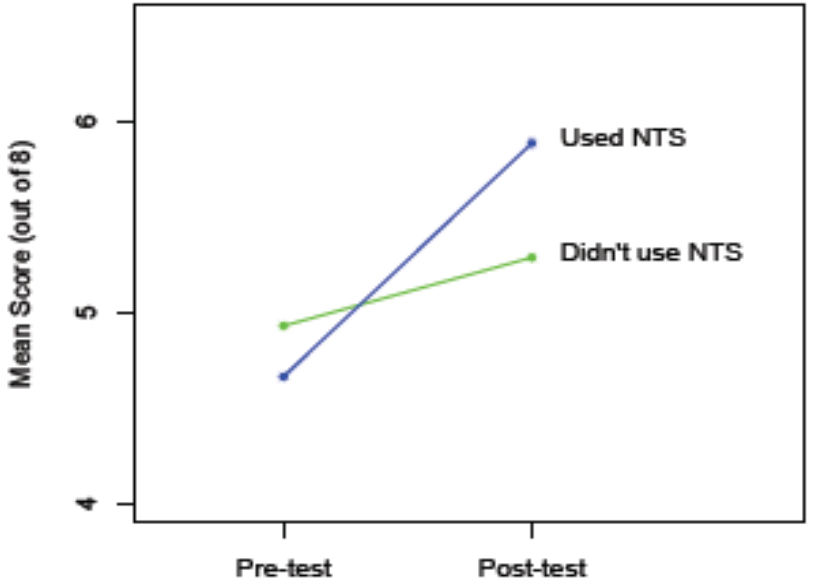
Clear selection

The Outcomes

NTS

- Students took a "pre-test" and "post-test" during lab before and after being given access to the LO.

	Mean Scores (Out of 8)	
	Pre-test	Post-test
NTS	4.66	5.88
	(4.4, 4.9)	(5.7, 6.1)
Control	4.92	5.29
	(3.8, 6.0)	(4.0, 6.6)



The Outcomes

Creation of Inter-disciplinary LOs

Four Characteristics of Good Mathematical Writing

This website focuses on the following four characteristics of good mathematical writing. Each solution should:

1. Begin with a restatement of the question

   You **Restate The Problem** by explaining what the problem is asking for *as you understand it.*

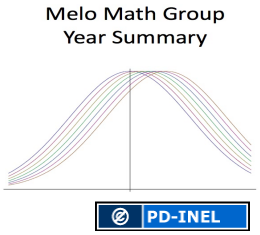
2. Include computations with explanations

   Computations With Explanations are mathematical expressions which are continually being justified and clarified by prose.

3. Provide figures, graphs, tables, etc. whenever appropriate

4. End with a clear, concise conclusion.

   Conclusions are the results of your computations as well as *insightful* observations about these results.

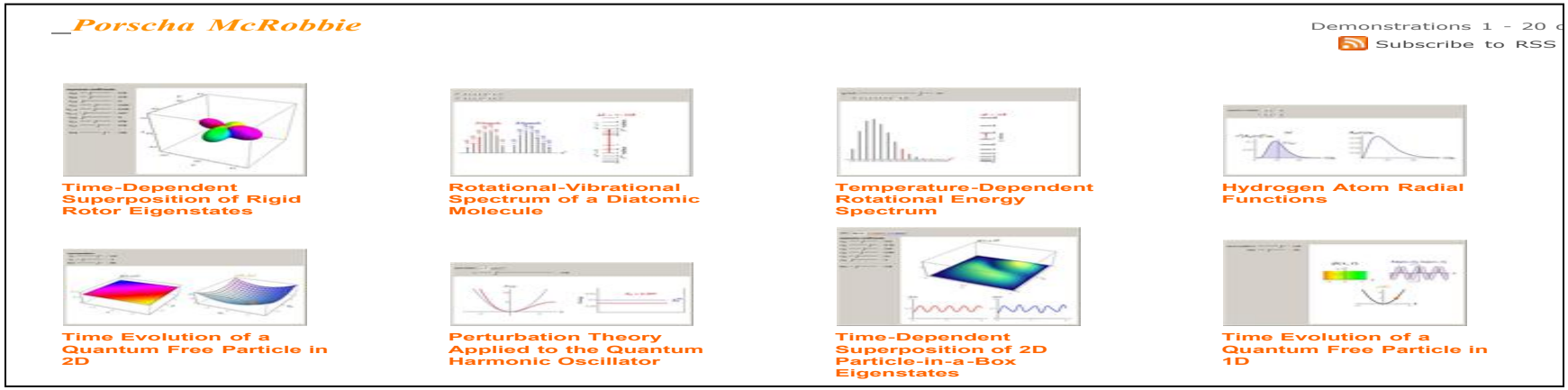


http://instruct.math.lsa.umich.edu/support/teamhomework/

The Outcomes

Graduate Student Impact

Porscha McRobbie – Interactive Wolfram LOs for physical chemistry concepts



- **Professional development and Career Decisions**

Porscha McRobbie: Accepted a position with Wolfram Demos.

Noah Gardner: "Opened me up to a whole new teaching style"; "my favorite part of my graduate school experience. I now intend to teach…. "

Tanya Breault: Considered dropping out of graduate school. Is now "committed to a career in teaching and research"

The Outcomes

➔ New LO Projects

Transforming A Large Lecture To An Interactive Personalized Online Format

Funding

Level 2 Grant

from UM LSA-ITC (Instructional Tech Committee)

- transition from a live lecture to a web-based multimedia online format so as to offer personalized, ultra-accessible teaching and learning opportunities

Transforming Lecture

Why?

- The large (450 seat) lecture hall setting is NOT conducive to active learning

Transforming Lecture

Why?

Students in the large introductory class are heterogeneous with respect to learning styles and background knowledge and…

Transforming Lecture

Stepping Stones to Pedagogical Innovations

- Online Learning Resources

Rob Pearce, "Laptop and working lunch. An outside table with a silver laptop, coffee and a sandwich on it", Flickr

s_falkow, "Film with Images", Flickr

- Video Capture of demonstrations

- Podcasts

derrickkwa, "podcast_subscribe", Flickr

- Software

The Outcomes

Awards, Workshops, Conference Presentations

- Provost's Teaching Innovation Prize (TIP - UM)

  (Brenda Gunderson, 2011)
- LO Flipbook Video Award

  (Adena Rottenstein, 2011)
- Innovative Use of MERLOT Award (SloanC/MERLOT Intl Conf)

  (Nancy Kerner, 2009)
- U-M Enriching Scholarship Workshops (2008 – current)
- MERLOT/Sloan-C Conference Presentations (2009-)
- Graduate students/faculty ➔ MERLOT LO peer reviewers

Overall Outcome

Moving from a model where students are not only engaged learners but also co-teachers

Moyan Brenn, "Road", Flickr

Thank You!

UM LSA-ITC

Any Questions?

Additional Source Information

for more information see: http://open.umich.edu/wiki/CitationPolicy

Slide 3, Image 3: JimileeK, "book, laptop", Flickr Image, http://www.flickr.com/photos/jimileek/3755343389/, CC:BY, http://creativecommons.org/licenses/by/2.0/deed.en

Slide 10, Image 2: muppetspanker, My Unread Pile of Books, Flickr Image, http://www.flickr.com/photos/muppetspanker/748894499/, CC: BY, SA, http://creativecommons.org/licenses/by-sa/2.0/deed.en

Slide 10, Image 3: Horia Varlan, "Hardcover book gutter and pages", Flickr Image, http://www.flickr.com/photos/horiavarlan/4268896468/, CC:BY, http://creativecommons.org/licenses/by/2.0/deed.en

Slide 12, Image 2: Matthew Wynn, Lightbulb!, http://www.flickr.com/photos/matthew_wynn/4601859272/ , CC BY 2.0, http://creativecommons.org/licenses/by/2.0/deed.en

Slide 33, Image 3: Rob Pearce, "Laptop and working lunch. An outside table with a silver laptop, coffee and a sandwich on it", Flickr Image, http://www.flickr.com/photos/54268887@N00/5056901103/in/photostream/, CC: BY, http://creativecommons.org/licenses/by/2.0/

Slide 33, Image 4: s_falkow, "Film with Images", Flickr Image, http://www.flickr.com/photos/safari_vacation/5842069535/in/photostream/, CC: BY, NC, http://creativecommons.org/licenses/by-nc/2.0/

Slide 31, Image 1: Velkr0, Flickr. http://www.flickr.com/photos/velkr0/3472576304/, CC:BY, http://creativecommons.org/licenses/by/2.0/deed.en

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