



Traditional Lecture



Pedagogical Path

Lecture Homework Recitation

Challenges:

While in the traditional lecture (sage on the stage) the hero of the story is usually the teacher. The engaged learning method places the teacher in the role of mentor (guide on the side) where the hero is the student and the mentor gives them magical gifts so that they can go on in their careers to conquer evil and bring a new level of prosperity to the themselves and the World. The traditional lecture format provides a great deal of contol to the teacher because it is scripted and rarely challenged by the students during class. Engaged learning is a wild ride where the teacher can easily be derailed by great question or unexpected student responses during class. This leads to a rather unstable experience. But, it is great fun and quite enjoyable.

Workflow and issues converting from traditional lecture

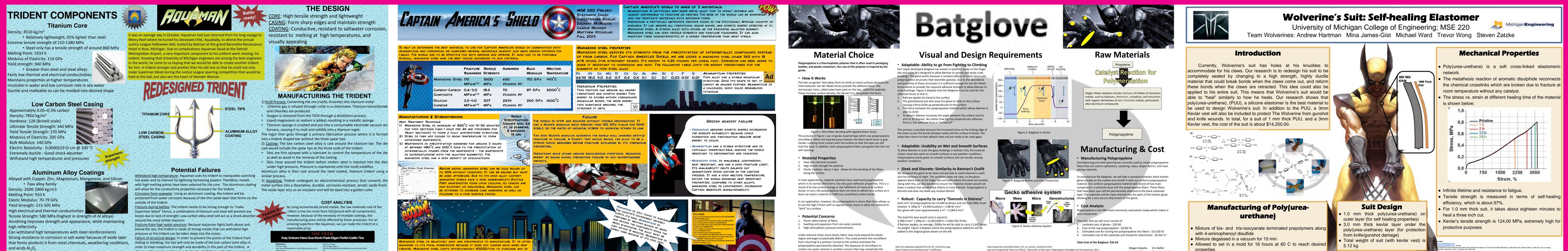
Same reading as is always assigned.

Assign the same homework but make it a bit harder

Build peer instruction problems by using your old lecture notes. A typical 50 minute class session will have about 4-8 LearningCatalytics questions. This is about the number of learning objectives most faculty have per 50 minute lecture. Hence, simply ask what 4-8 things you wanted to teach your students in a lecture and make up 4-8 problems that do the same thing. Much of the time, it will just be the examples in your lectures. Mixing in some deeper estimation exercises will help your students learn how to make assumptions when applying concepts.

Examples of Posters from the Designing a Component of a Superhero Costume

Time



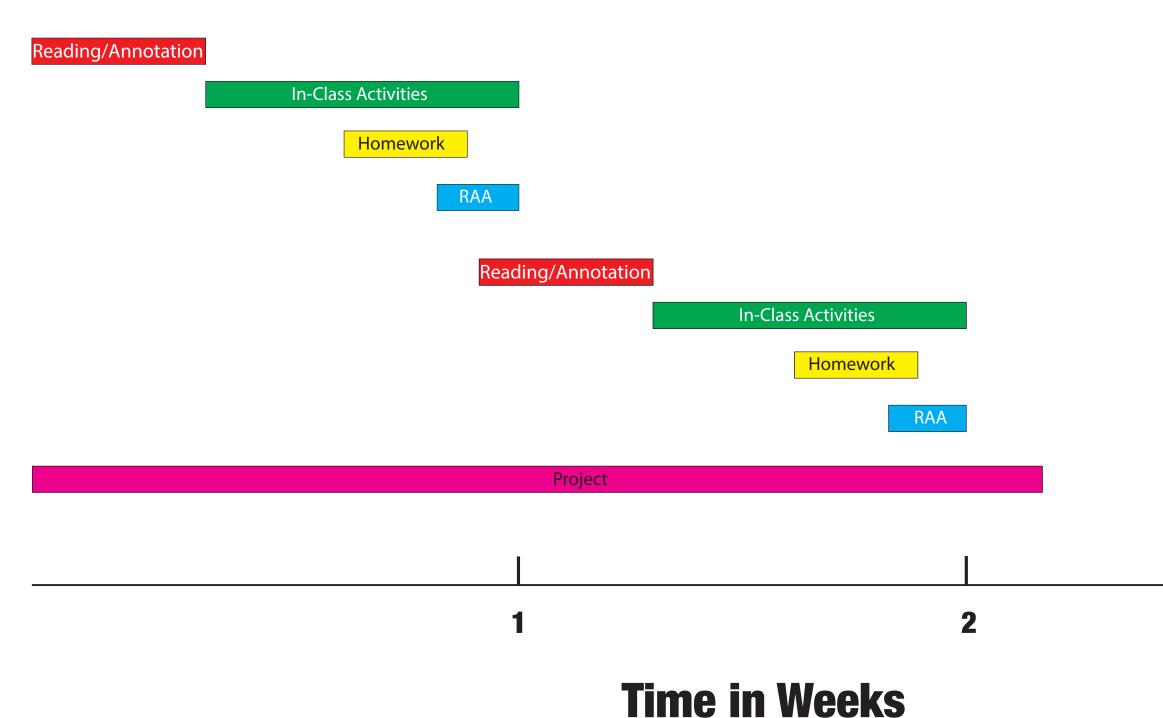
Scalable Engaged Learning Environments Replacing Traditional Large Lectures With Little to No Extra Cost¹

A Third Century Initiative Quick Wins Project

Engaged Learning Environment



Pedagogical Path



SCALABILITY:

Flat classroom large enough to accommodate students.

One double sided whiteboard per 10 students

One GSI, one IA for inclass work, and one IA for grading per every 30 students **One instructor**

Estimated recurring costs: less than \$30.00 per student above traditional lecture

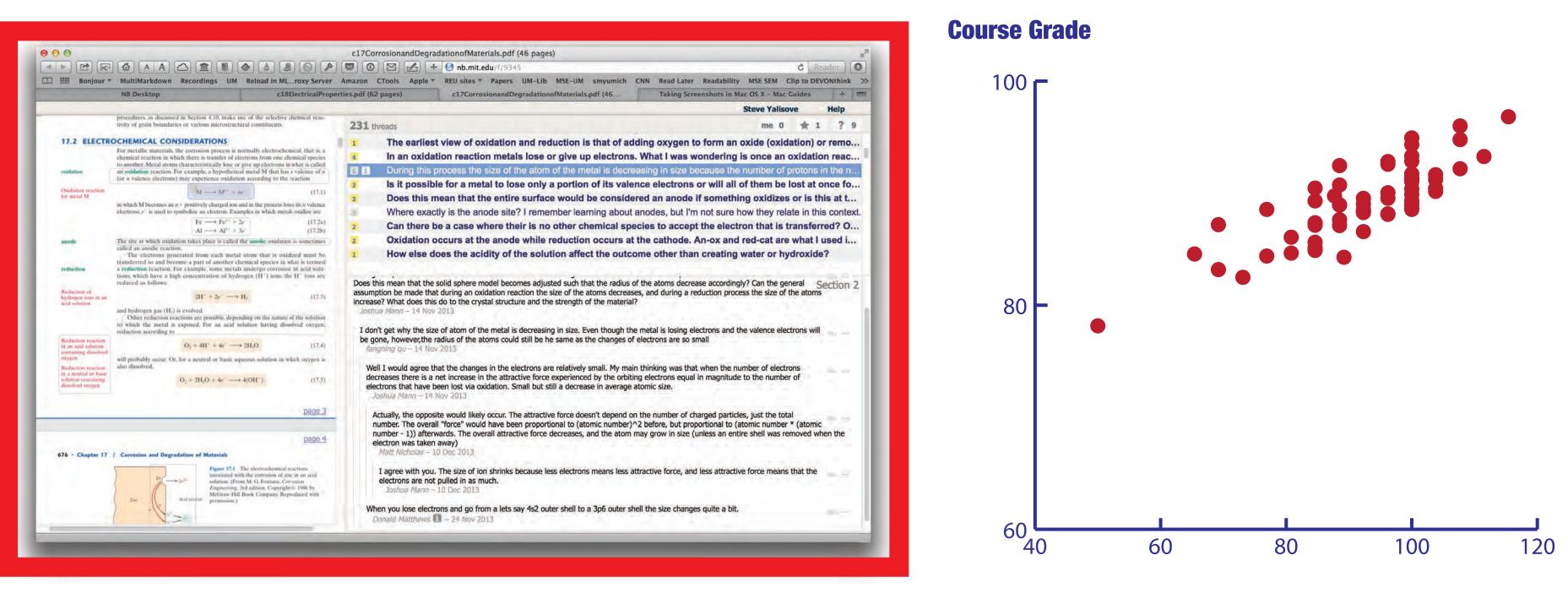
Steve Yalisove, Materials Science and Engineering

Learn More at http://java.engin.umich.edu/220f13

nb.mit.edu

First presentation of matertial is from the book.

Asynchronous social document brings peer instruction into the discovery phase. **Demand synthetic/analytic statements, questions, or answers to questions. Rubric for annotation grading based on quality, quantity, and timeliness**



In-class activities

Composition (at% Bi)

B Sn + Bi

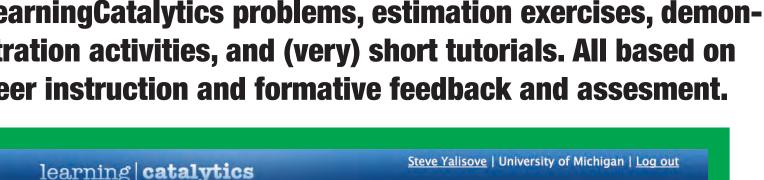
Composition (wt% B)

20 40 60 80 100

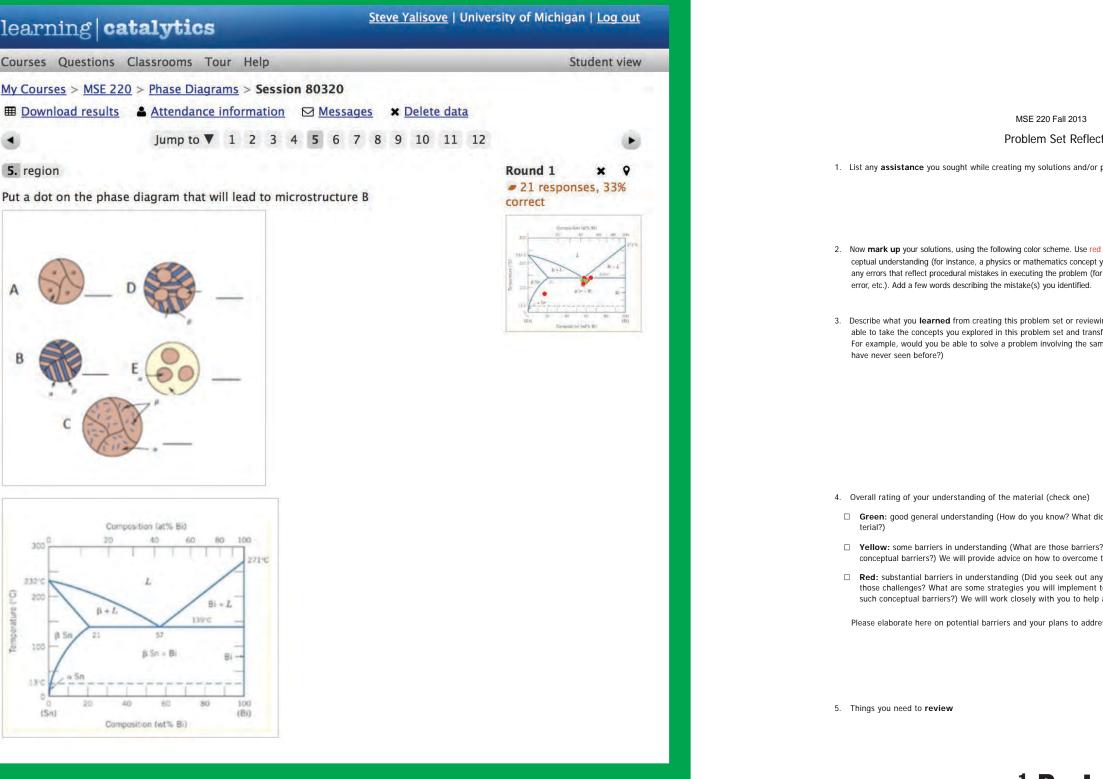
5. region

LearningCatalytics problems, estimation exercises, demonstration activities, and (very) short tutorials. All based on peer instruction and formative feedback and assesment

> Phase Diagrams > Session 80320



Homework Reflection and Rubric





UNIVERSITY of MICHIGAN

Annotation Score as Function of Course Grade

nb.mit.edu Score

MSE 220 Fall 2013				
Problem Set Reflection Name:		MSE 220 Fall 2013		
ating my solutions and/or places you got "stuck":	Name:		PS: \$	Score:
	EFFORT		. 10 、	
	EFFORI			
owing color scheme. Use red to identify any errors that reflect a lack of con-	Criterion	Majority of problems/solutions	About half the problems/solutions	Less than half the problems/solutions
ics or mathematics concept you did not understand). Use blue to identify in executing the problem (for example, incorrect substitution, calculation mistake(s) you identified.	Expectations for each solution to a problem articulated before div- ing into the details?	3	2	1
g this problem set or reviewing it in class. (Do you think you would be n this problem set and transfer those concepts in a whole new context? a problem involving the same materials concepts, but of a form you	Were longer problems broken down into smaller, more manage- able pieces?	3	2	1
	Were solutions checked for rea- sonableness?	3	2	1
	Were solutions well organized?	3	2	1
	Appropriate use of diagrams, graphical, tabular representations?	3	2	1
	Are symbols defined and diagrams adequately labeled?	3	2	1
	REFLECTION			
e material (check one) ow do you know? What did you do to ensure you understood the ma-	Criterion	Mostly	Half	Less than half
	Are mistakes correctly identified?	3	2	1
g (What are those barriers? What efforts did you take to overcome such tvice on how to overcome the barriers you identified.	Are conceptual difficulties correctly identified?	3	2	1
ling (Did you seek out any of the course resources to honein on egies you will implement to better learn those concepts and overcome < closely with you to help address the barriers you identify.	Is the overall assessment reason- able?	3	2	1
rs and your plans to address these:	Additional Feedback:			

¹ Parts of this work are based on Eric Mazur's AP 50 at Harvard University