

# Scalable Engaged Learning Environments

### Replacing Traditional Large Lectures With Little to No Extra Cost<sup>1</sup>

A Third Century Initiative Quick Wins Project

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

#### **Traditional Lecture**



#### **Pedagogical Path**

Reading Lecture Homework Recitation Exam

#### **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.

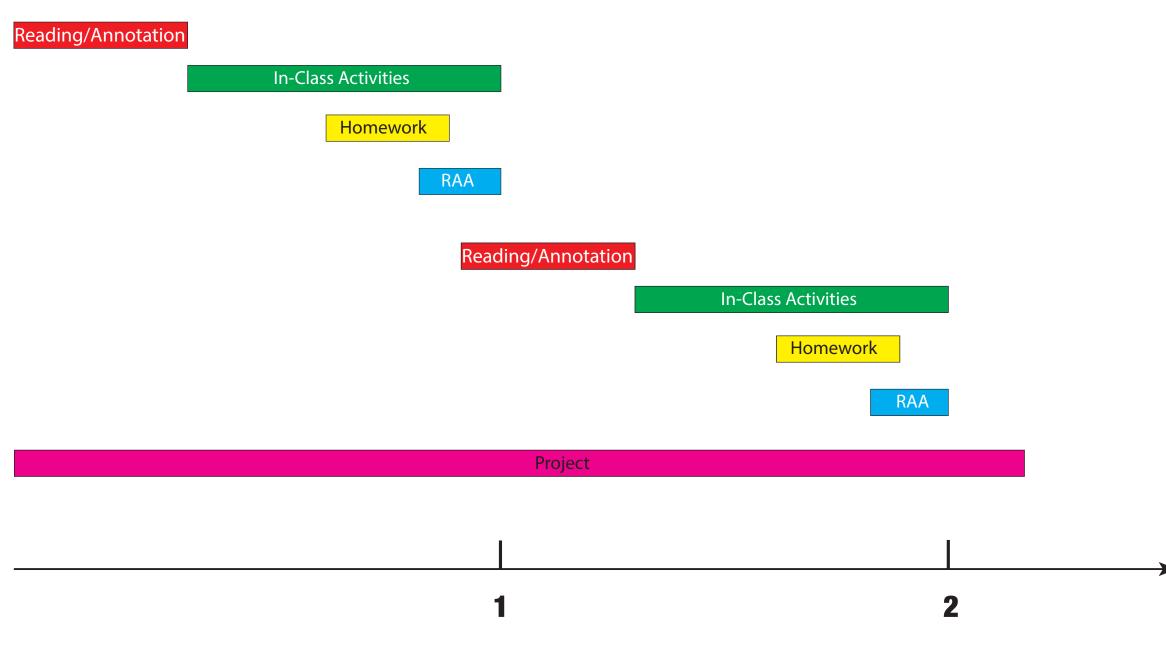
Assign the same homework but make it a bit harder

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.

#### **Engaged Learning Environment**



#### **Pedagogical Path**



#### **Time in Weeks**

#### **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

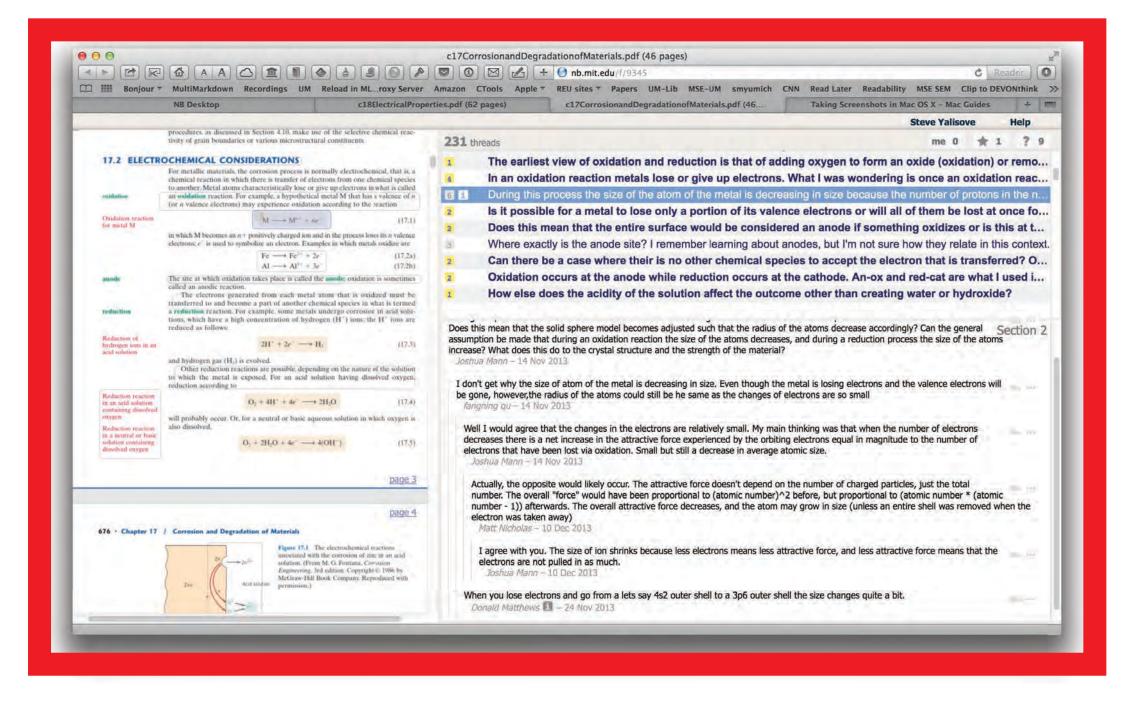
#### nb.mit.edu

First presentation of matertial is from the book.

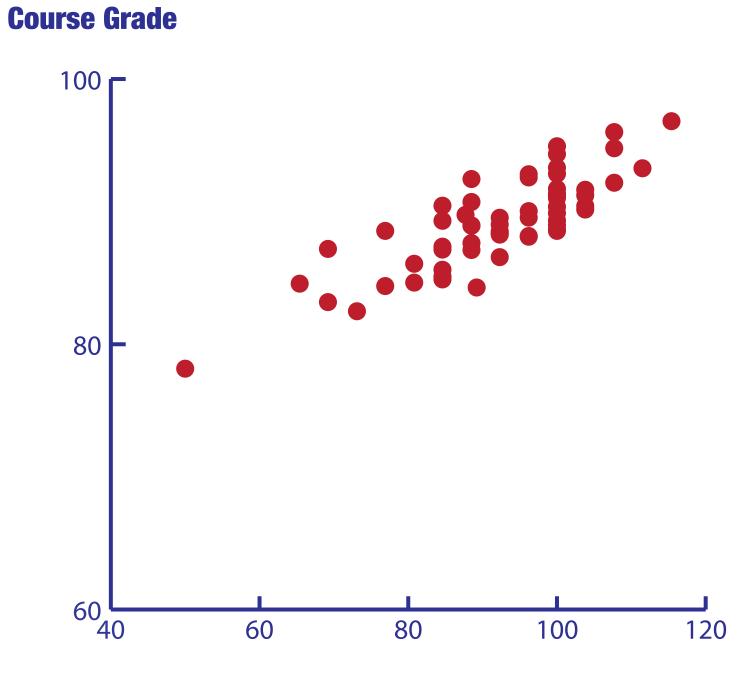
Asynchronous social document brings peer instruction into the discovery phase.

Demand synthetic/analytic statements, questions, or answers to questions.

Rubric for annotation grading based on quality, quantity, and timeliness



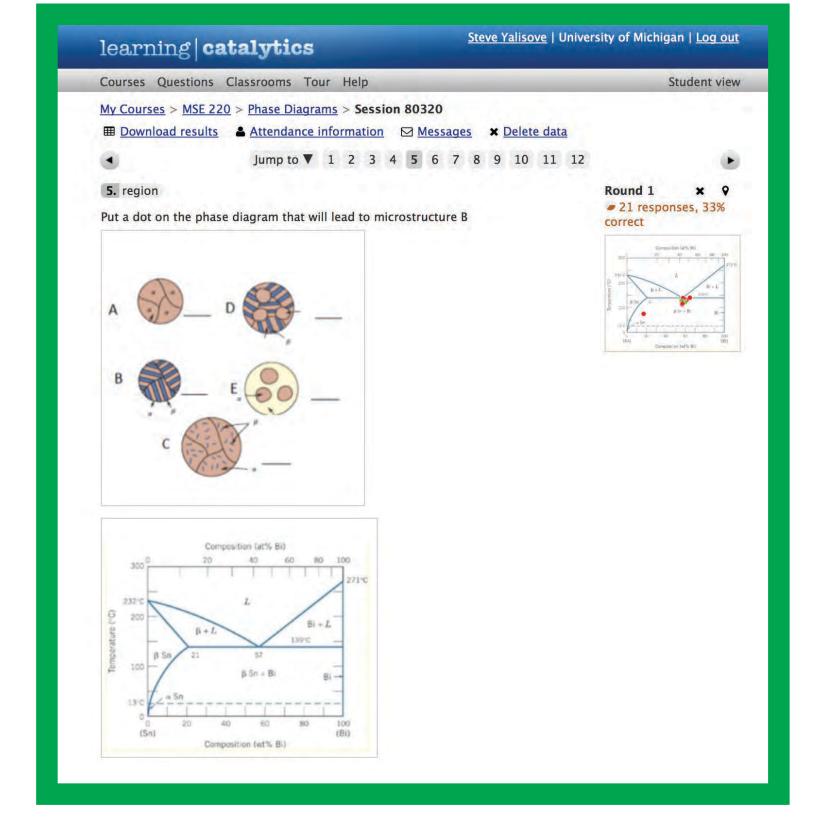
## **Annotation Score as Function of Course Grade**



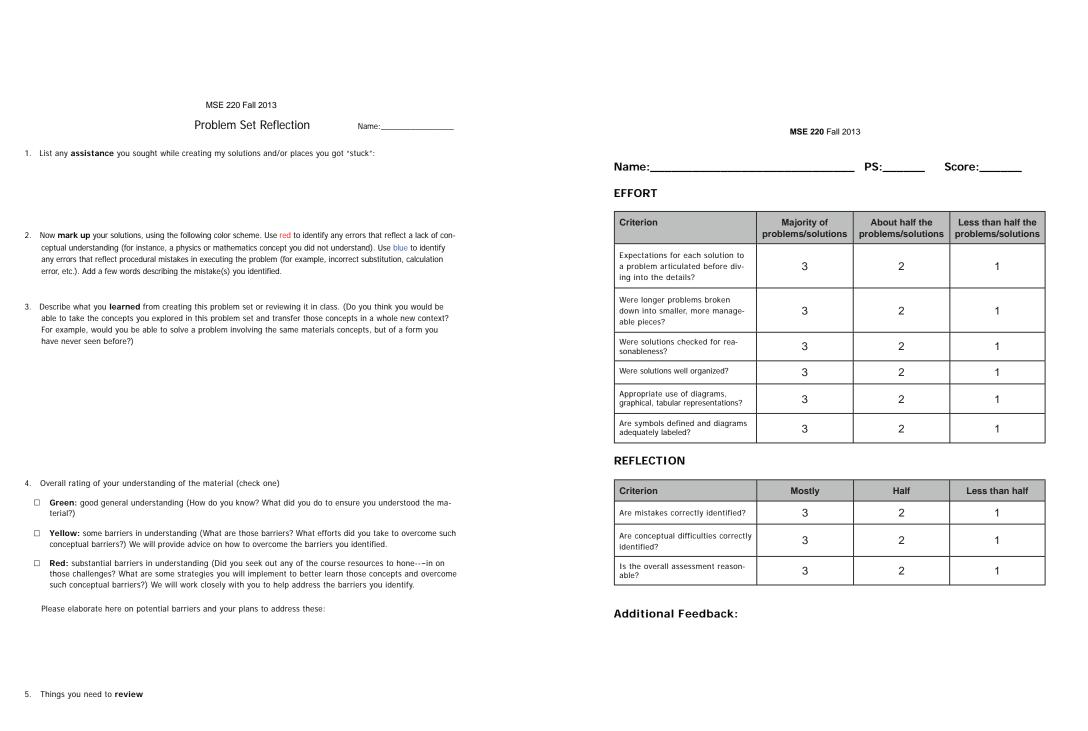
nb.mit.edu Score

#### **In-class activities**

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



#### **Homework Reflection and Rubric**



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

