Technology for On/ Off Campus Learning

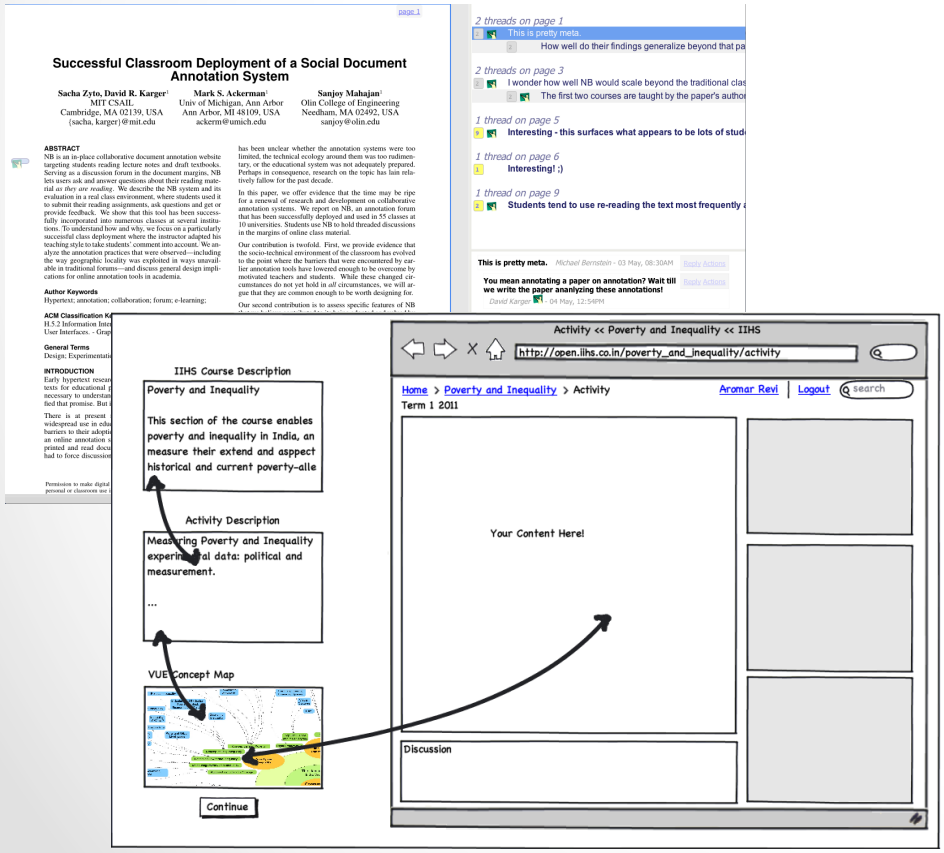
An Overview

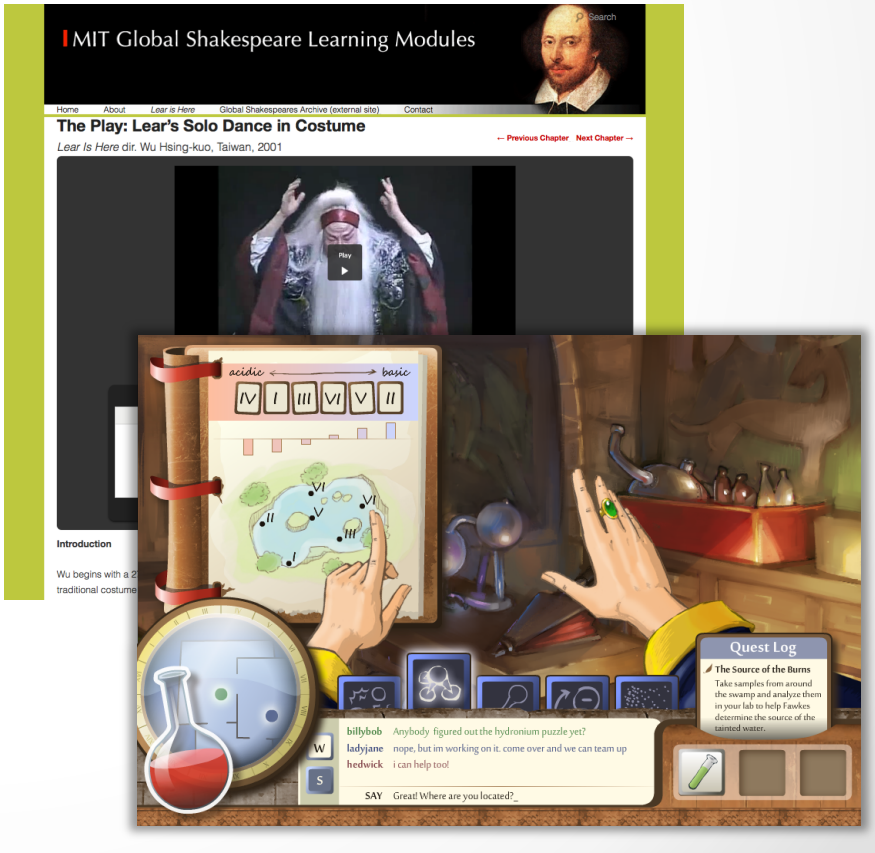
Eric Klopfer

David Karger, Rob Miller, Haynes Miller, Karen Wilcox, Jeff Merriman, Brandon Muramatsu, Peter Donaldson, Dave Pritchard

Technologies

- Themes
  - We have many technologies already in R&D and use across campus (well beyond those presented today)
  - We also face issues in scaling and transfer across classes/domains





Technologies

- Nb – Collaborative PDF Annotation
  - David Karger
- Caesar - Crowdsourced Code Review
  - Rob Miller
- Crosslinks – With and Across Course Concept Links
  - Haynes Miller + Karen Wilcox
- MC3 – MIT Core Concept Catalog
  - Jeff Merriman + OEIT
- Video Capture
  - Brandon Muramatsu + OEIT
- Video Editing/Mixing
  - Pete Donaldson
- Online Course Data Mining
  - Dave Pritchard
- Games
  - Eric Klopfer

Nb

- Threaded discussions like a forum
  - But in document margin
- Standard web site
- Faculty initiates
  - signs up
  - invites students
  - uploads PDFs
- Students discuss
  - Highlight text, enter comment
  - Reply to existing comment

Files | Nav

4/5

126%

Home | r20-dimensions-light-bending.pdf | r19-dimensions-hydrogen.pdf

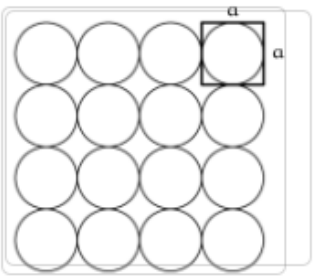
2 global comments | New ...

94

5.3.2 Atomic sizes and substance densities

Hydrogen has a diameter of 1Å. A useful consequence is the rule of thumb is that a typical interatomic spacing is 3Å. This approximation gives a reasonable approximation for the densities of substances, as this section explains.

Let A be the atomic mass of the atom; it is (roughly) the number of protons and neutrons in the nucleus. Although A is called a mass, it is dimensionless. Each atom occupies a cube of side length $a \sim 3\,\text{Å}$, and has mass Am_{proton}. The density of the substance is



m_{proton} if you multiply this
e N_A is Avogadro's number:

is defined. The denomina-

to remember N_A. However,
N_A arises in chemistry and
ection between microscopic
lculations:

What's that ?

Class
Staff
Myself

? Reply Requested
Sign

Discard
Save

Polls | Spotlight | Notes

6 note(s) 2?

Anonymous
Class
How did we get 3 from 1?

Anonymous
Class
The 1 was the diameter of hydrogen. Th
interatomic spacing.

Anonymous
Class
The 3 and 1 represent 2 different values
space between all atoms while 1A is the
specifically.

Anonymous
Class 2?
So hydrogen atoms are spaced by only
atoms are typically spaced between 3A?
correctly?

Anonymous
Class
Why doesn't this vary significantly base
atom? Or is three just the overall averag

Instructor
Class
As you say, it is based on the size of th
the very small end, and uranium is at the
Angstroms is a good average size to us
atoms in ordinary substances. As a *ver
approximation, think of the diameter as
(The number of shells is the row number

1 note(s)
Too many 'is's in this sentence.

1 note(s)
This paragraph's wording is a little bit

1 note(s)
I feel like I have seen this drawing bef
what is the area of wholes in betwe

2 note(s) 1✓
If it's not a mass, don't call it a mass.

Successful Classroom Deployment of a Social Document Annotation System

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ABSTRACT
NB is an in-place collaborative document annotation website targeting students reading lecture notes and draft textbooks. Serving as a discussion forum in the document margins, NB lets users ask and answer questions about their reading material *as they are reading*. We describe the NB system and its evaluation in a real class environment, where students used it to submit their reading assignments, ask questions and get or provide feedback. We show that this tool has been successfully incorporated into numerous classes at several institutions. To understand how and why, we focus on a particularly successful class deployment where the instructor adapted his teaching style to take students' comment into account. We analyze the annotation practices that were observed—including the way geographic locality was exploited in ways unavailable in traditional forums—and discuss general design implications for online annotation tools in academia.

Author Keywords
Hypertext; annotation; collaboration; forum; e-learning;

ACM Classification Keywords
H.5.2 Information Interfaces and Presentation (e.g. HCI): User Interfaces. - Graphical user interfaces.

General Terms
Design; Experimentation; Human Factors;

INTRODUCTION
Early hypertext research offered the promise of annotating texts for educational purposes with the detailed discussion necessary to understand complex material. The Web amplified that promise. But it has not been fulfilled.

There is at present no collaborative annotation tool in widespread use in education. Past work revealed significant barriers to their adoption. For example, Brush's [3] study of an online annotation system reported that because students printed and read documents and comments offline, faculty had to force discussion by requiring replies to comments. It has been unclear whether the annotation systems were too limited, the technical ecology around them was too rudimentary, or the educational system was not adequately prepared. Perhaps in consequence, research on the topic has lain relatively fallow for the past decade.

In this paper, we offer evidence that the time may be ripe for a renewal of research and development on collaborative annotation systems. We report on NB, an annotation forum that has been successfully deployed and used in 55 classes at 10 universities. Students use NB to hold threaded discussions in the margins of online class material.

Our contribution is twofold. First, we provide evidence that the socio-technical environment of the classroom has evolved to the point where the barriers that were encountered by earlier annotation tools have lowered enough to be overcome by motivated teachers and students. While these changed circumstances do not yet hold in *all* circumstances, we will argue that they are common enough to be worth designing for.

Our second contribution is to assess specific features of NB that we believe contributed to its being adopted and valued by its users. Our design of NB's "situated discussions," contrasting with the traditional "linked hypertext" model, was motivated by the following design hypotheses:

- That the ability to comment in the margins, without leaving the document, would enable students to comment "in the flow" while reading, reducing the deterrent loss of context involved in commenting elsewhere;
- That the in-place display of comments in the margins would draw students' attention to relevant comments while reading, and encourage them to respond;
- That the physical location of comments with their subject matter would provide a valuable organizational structure distinct from the chronological organization typical of discussion forums, helping students aggregate related threads and consider them together;

Taken together, we believed these characteristics would drive a virtuous cycle, encouraging more students to participate more heavily, thus providing more helpful material for other students, yielding additional incentive to participate.

2 threads on page 1
2 This is pretty meta.
2 How well do their findings generalize beyond that pa

2 threads on page 3
2 I wonder how well NB would scale beyond the traditional clas
2 The first two courses are taught by the paper's autho

1 thread on page 5
9 **Interesting - this surfaces what appears to be lots of stud**

1 thread on page 6
1 **Interesting! ;)**

1 thread on page 9
2 **Students tend to use re-reading the text most frequently a**

This is pretty meta. *Michael Bernstein* - 03 May, 08:30AM Reply Actions

You mean annotating a paper on annotation? Wait till we write the paper ananlyzing these annotations! Reply Actions
David Karger - 04 May, 12:54PM

Problem: Feedback in 6.005

- Foundation-level course (250-300 students)
- Students write lots of code
- Automatic grading is necessary but not sufficient

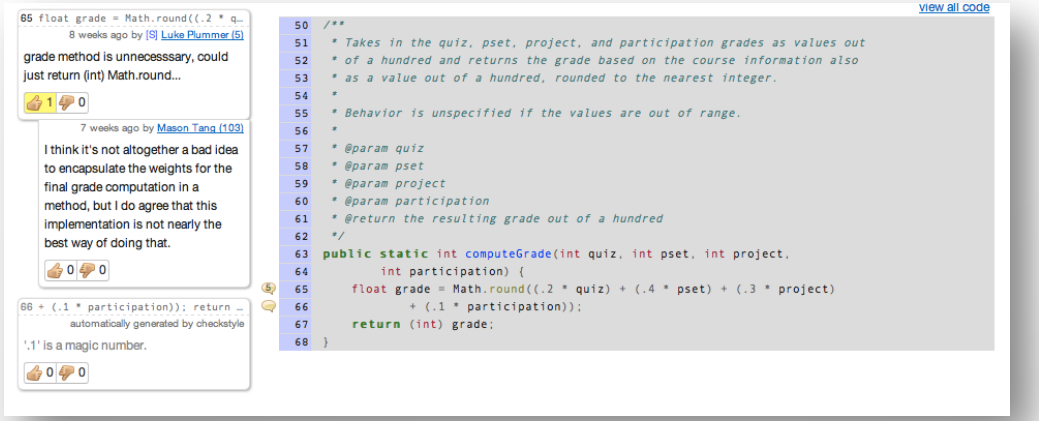
```
// compute n!  requires n >= 0
int factorial(int n) {
    if (n == 0) return 1;
    else return n * factorial(n-1);
```

correct and understandable

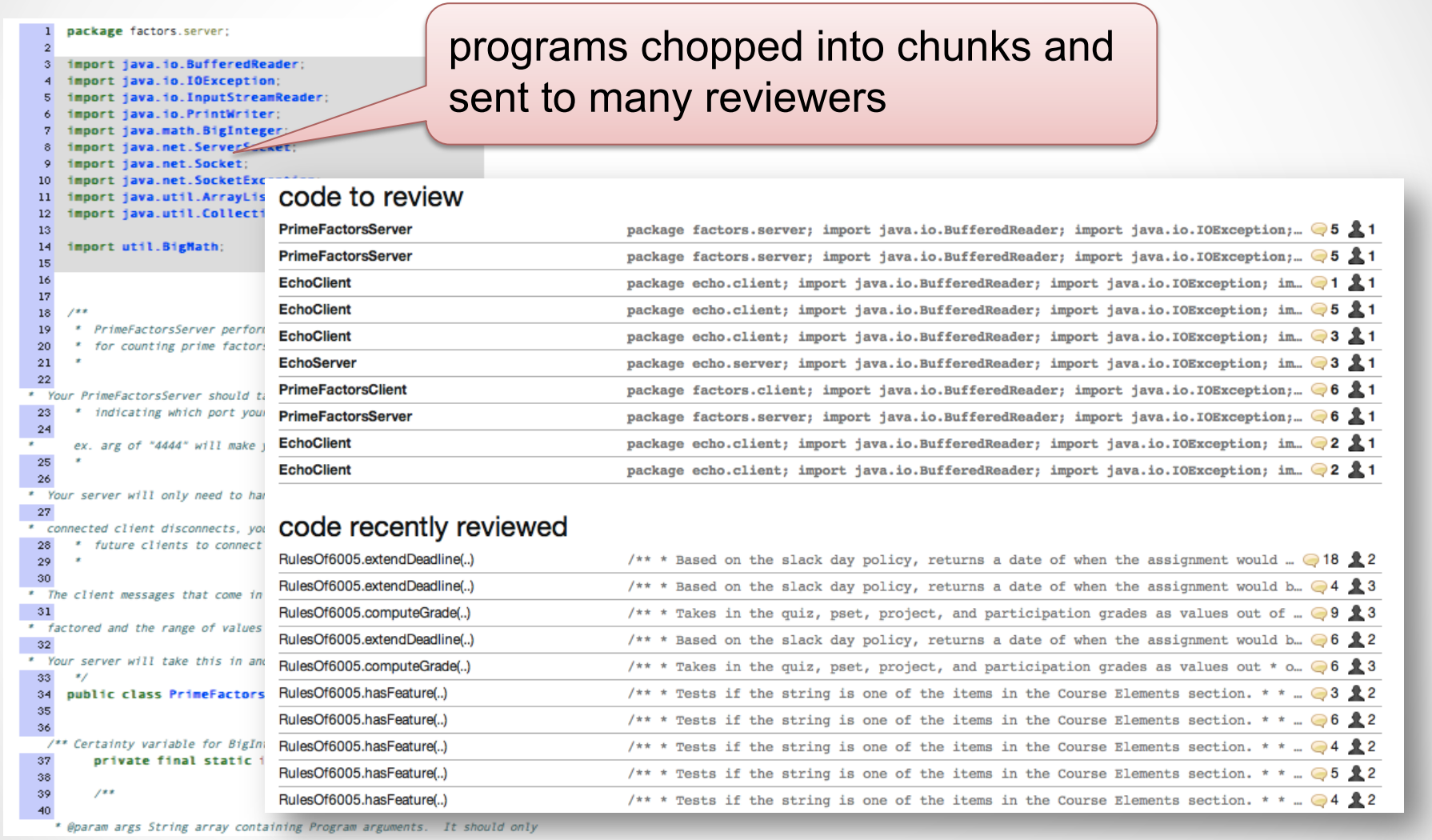
```
int factorial(int n) {
    int i, result=1;
    if (n == 0) result = 1;
    else {
        for (i = 1; i < n; ++i) result
        result = result*n;
        return result;
    }
    return 1;
}
```

correct but confusing

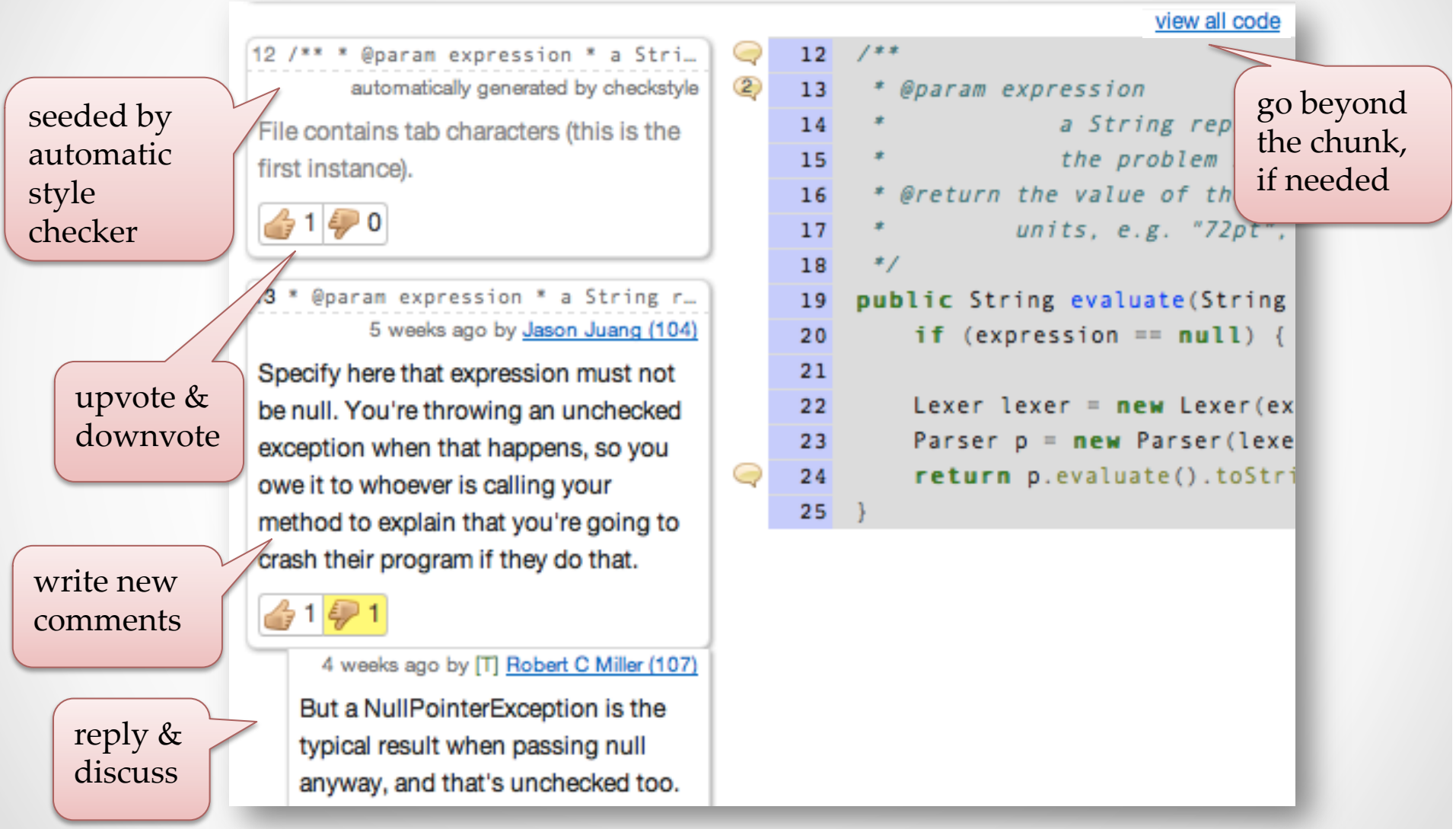
- Solution chop up the code into chunks and farm it out to students, staff and alumni



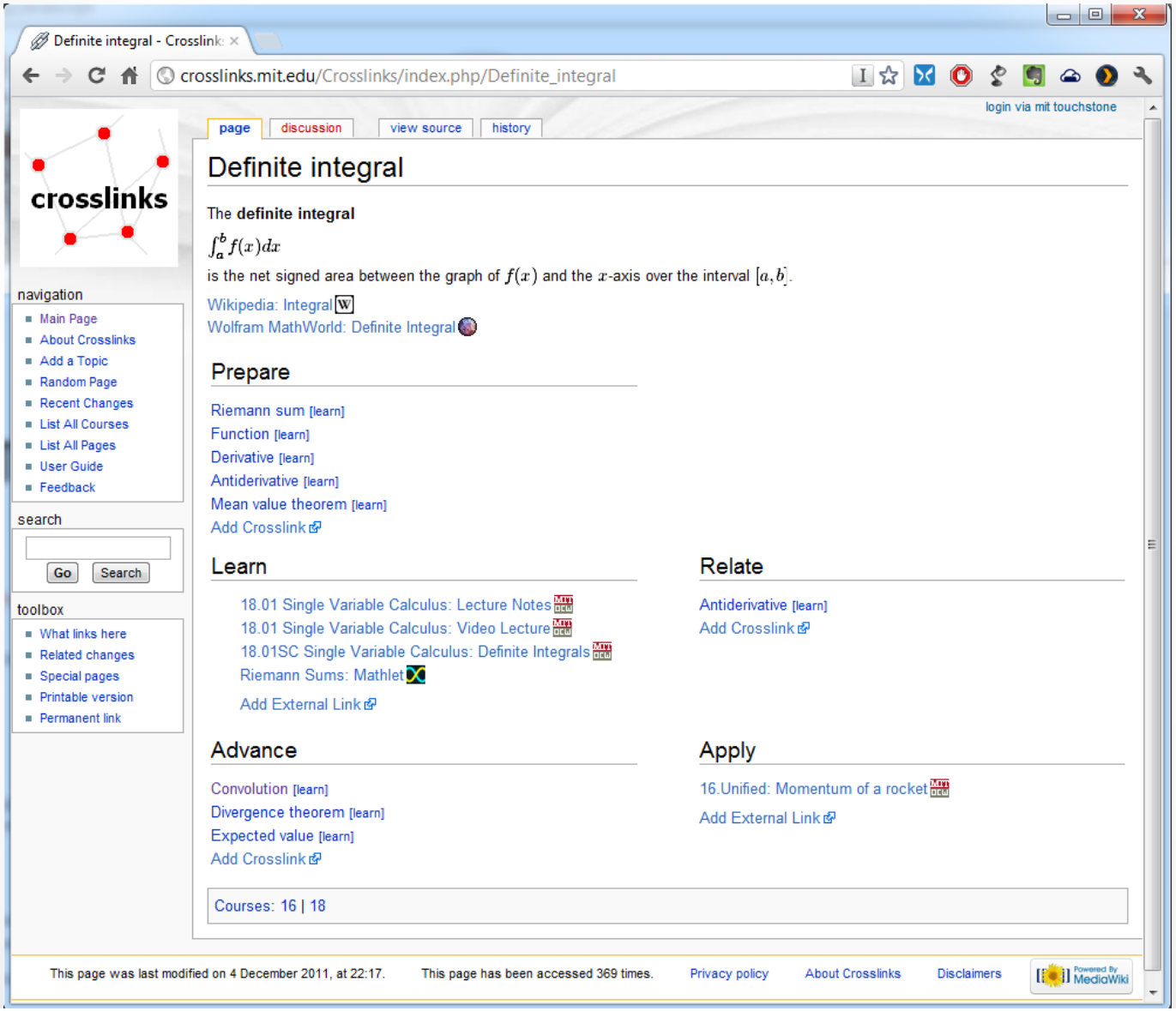
Caesar: Divide & Conquer



Social Reviewing



Crosslinks


Definite integral - Crosslink
crosslinks.mit.edu/Crosslinks/index.php/Definite_integral
login via mit touchstone
page
discussion
view source
history
crosslinks
navigation
Main Page
About Crosslinks
Add a Topic
Random Page
Recent Changes
List All Courses
List All Pages
User Guide
Feedback
search
Go
Search
toolbox
What links here
Related changes
Special pages
Printable version
Permanent link
Definite integral
The definite integral
$\int_a^b f(x)dx$
is the net signed area between the graph of $f(x)$ and the x-axis over the interval $[a,b]$.
Wikipedia: Integral
Wolfram MathWorld: Definite Integral
Prepare
Riemann sum [learn]
Function [learn]
Derivative [learn]
Antiderivative [learn]
Mean value theorem [learn]
Add Crosslink
Learn
18.01 Single Variable Calculus: Lecture Notes
18.01 Single Variable Calculus: Video Lecture
18.01SC Single Variable Calculus: Definite Integrals
Riemann Sums: Mathlet
Add External Link
Relate
Antiderivative [learn]
Add Crosslink
Advance
Convolution [learn]
Divergence theorem [learn]
Expected value [learn]
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Apply
16.Unified: Momentum of a rocket
Add External Link
Courses: 16 | 18
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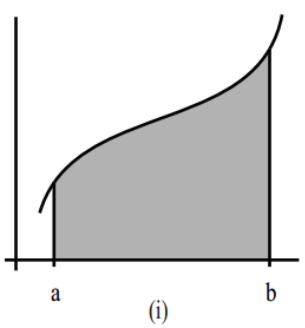
Lecture 18: Definite Integrals

Integrals are used to calculate cumulative totals, averages, areas.

Area under a curve: (See Figure 1.)

1. Divide region into rectangles
2. Add up area of rectangles
3. Take limit as rectangles become thin



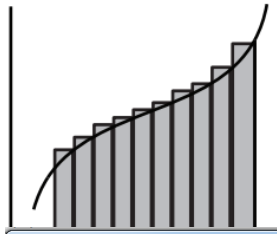


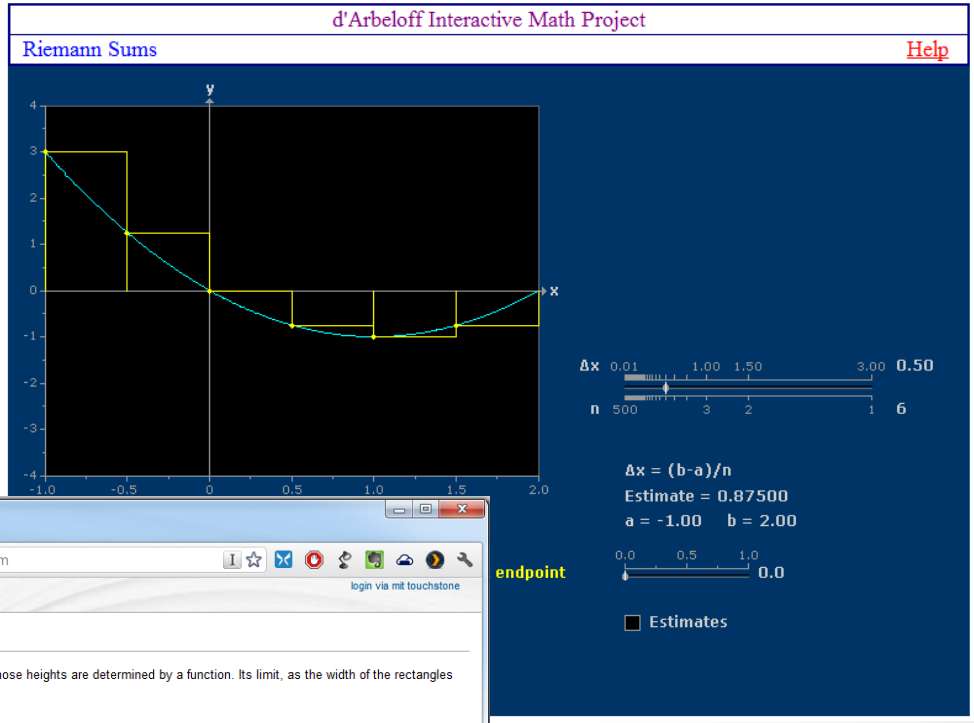
Figure 1: (i) Area under a curve; (ii) sum

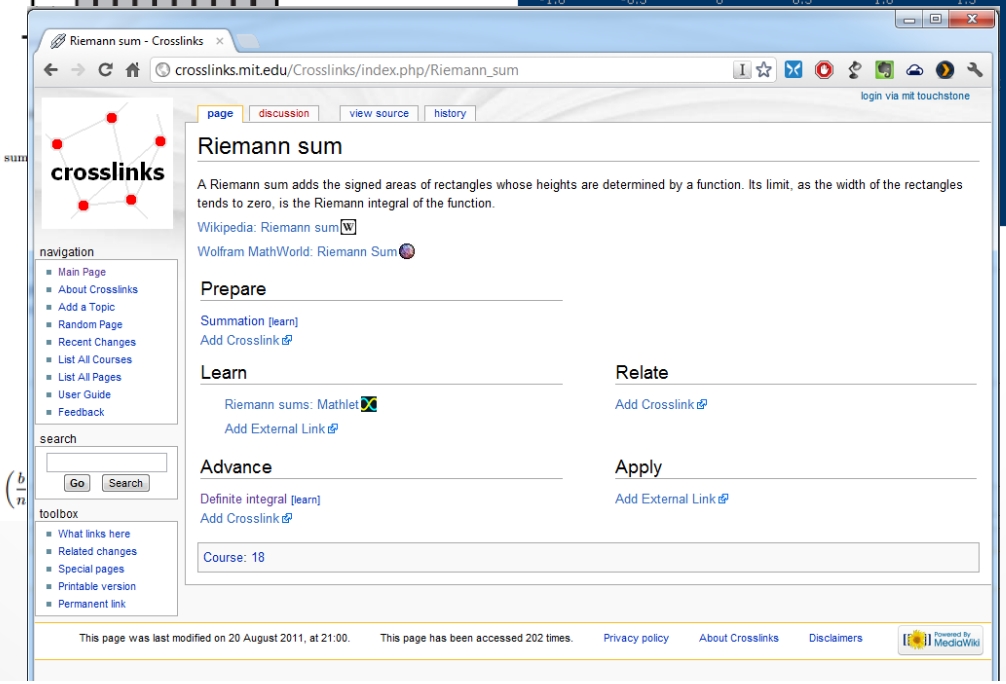
Example 1. $f(x) = x^2$, $a = 0$, b arbitrary

1. Divide into n intervals
   Length $b/n =$ base of rectangle
2. Heights:
   - 1^{st}: $x = \frac{b}{n}$, height $= \left(\frac{b}{n}\right)^2$
   - 2^{nd}: $x = \frac{2b}{n}$, height $= \left(\frac{2b}{n}\right)^2$

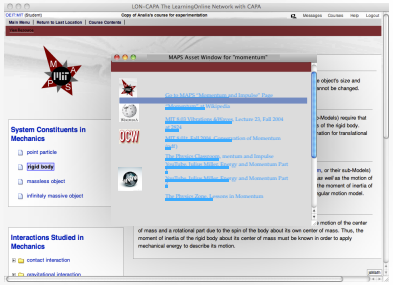
Sum of areas of rectangles:

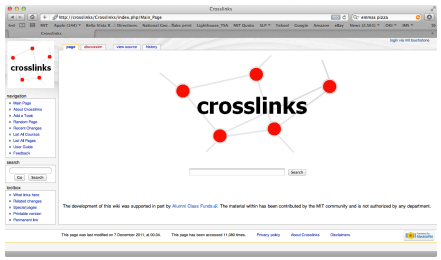
$$\left(\frac{b}{n}\right)\left(\frac{b}{n}\right)^2 + \left(\frac{b}{n}\right)\left(\frac{2b}{n}\right)^2 + \left(\frac{b}{n}\right)\left(\frac{3b}{n}\right)^2 + \cdots + \left(\frac{b}{n}\right)$$

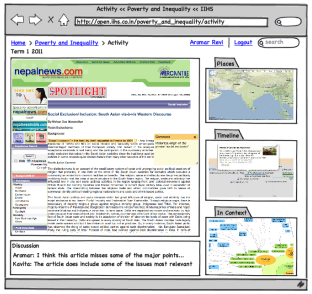




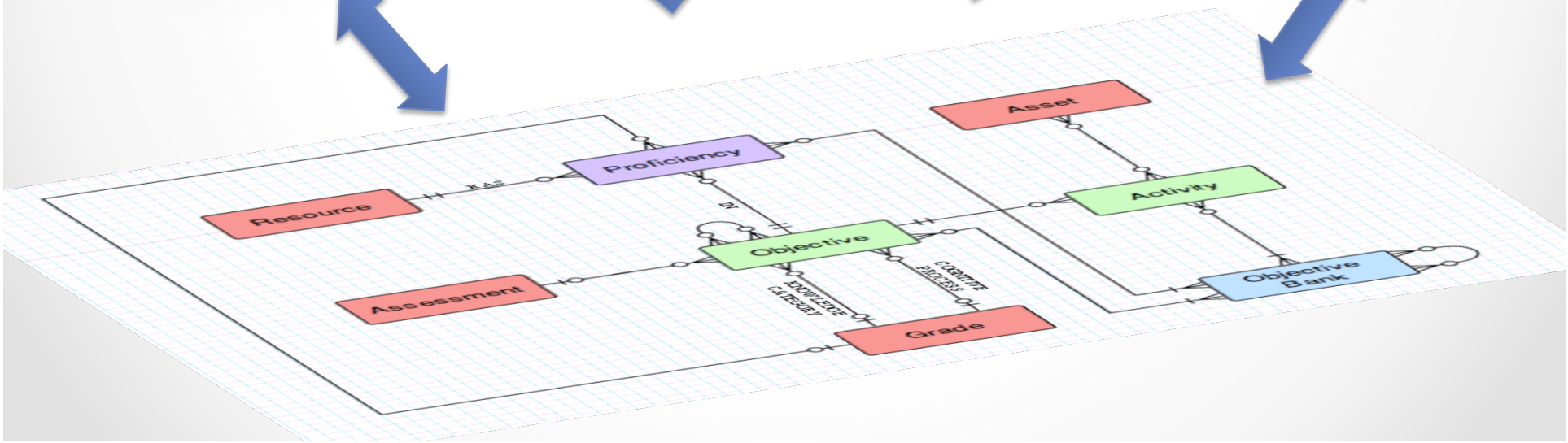
The MC3 Service

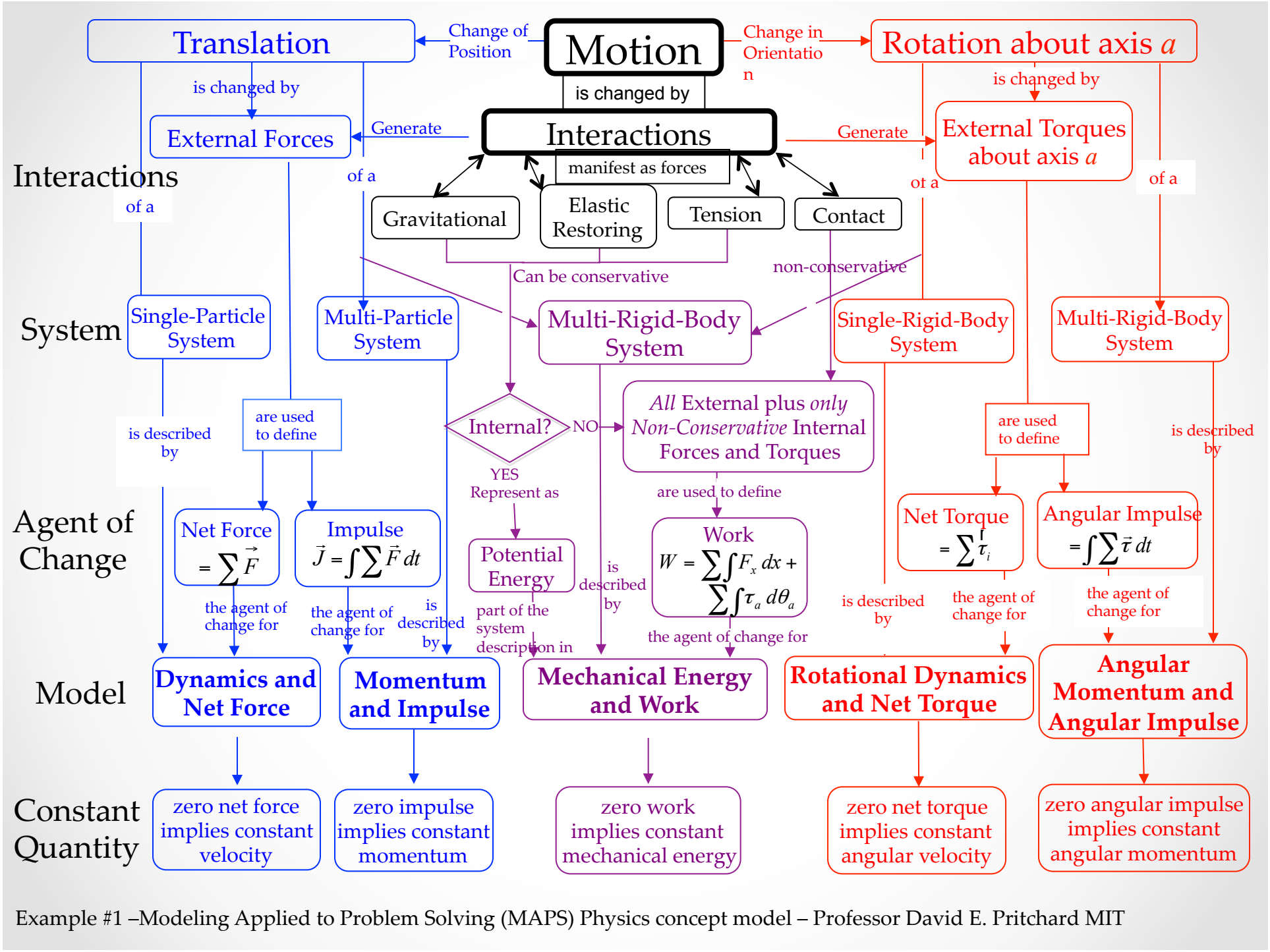




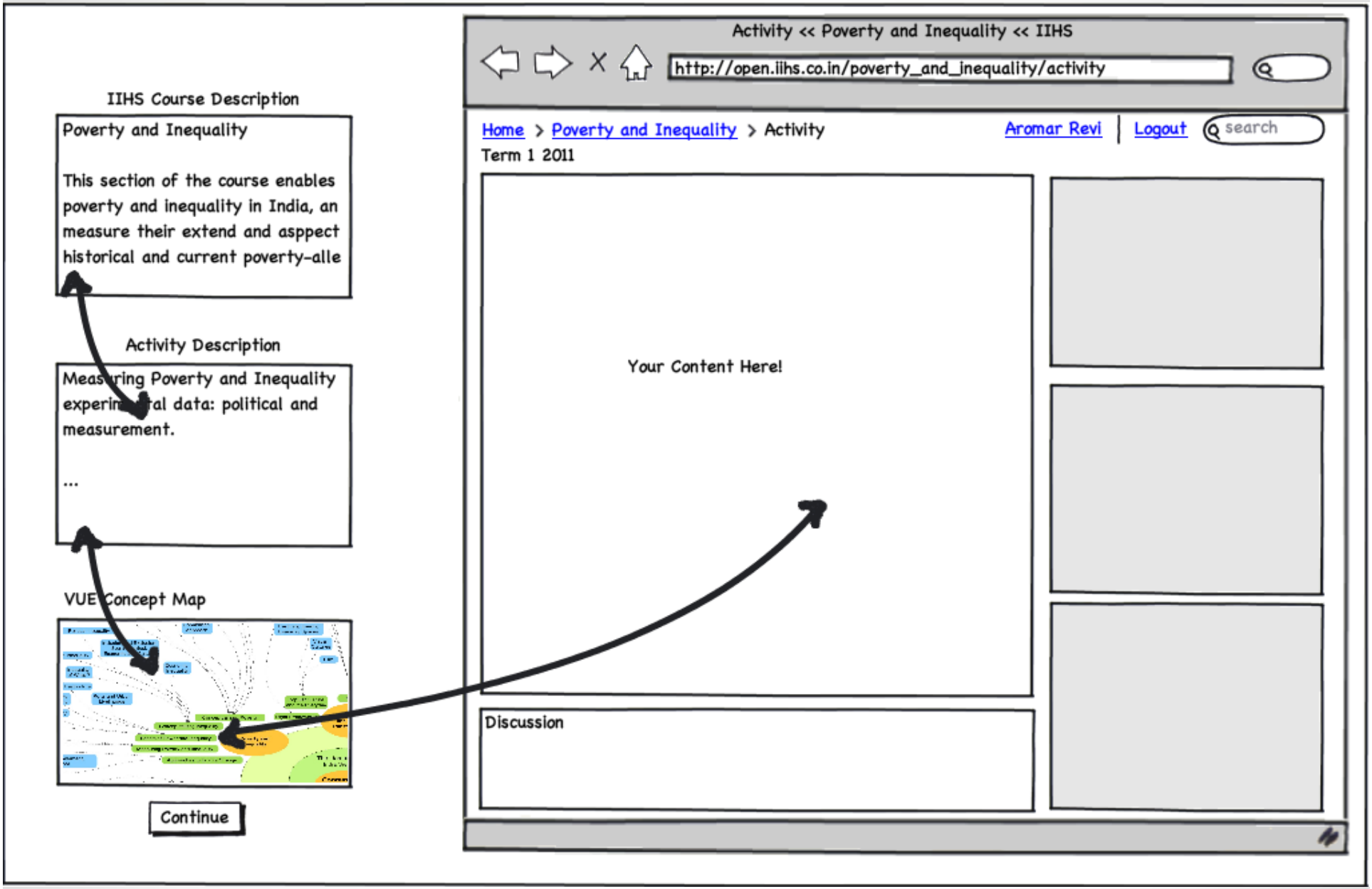


Other



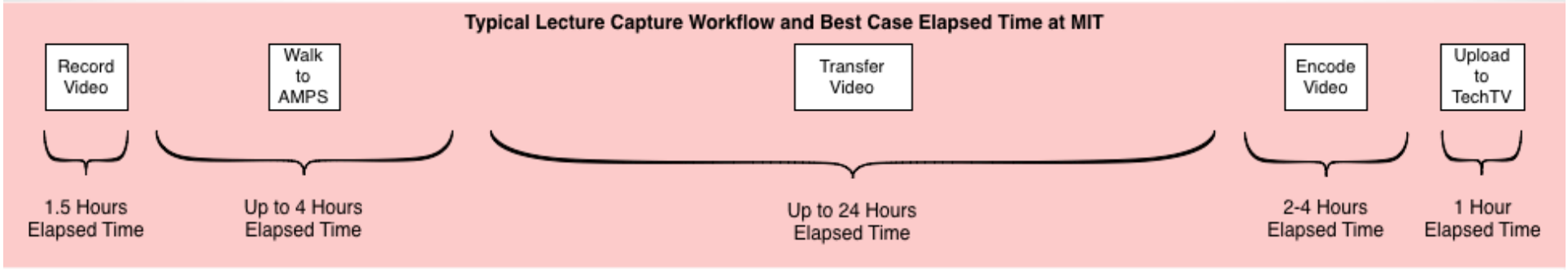


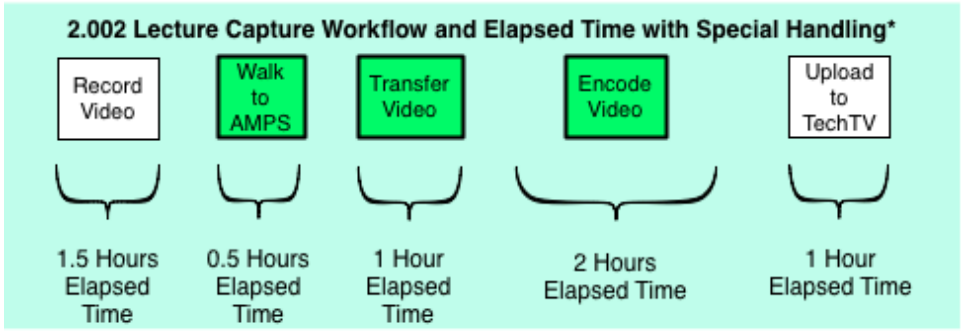
Example #1 –Modeling Applied to Problem Solving (MAPS) Physics concept model – Professor David E. Pritchard MIT



The goal of MC3 is to enable various kinds of educational applications to re-use concept-content relations. In this case we can imagine a student guided learning application that shared the same concept model with the map that the faculty used to develop the curriculum.

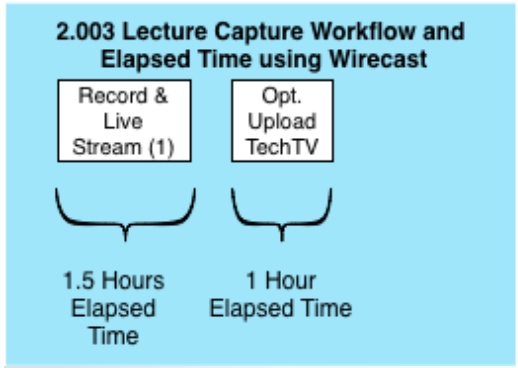
Video





Typical
Typical Case: 1.5:30 = 0.05

Special Handling
Best Case: 1.5:4.5 = 0.33
Worst Case: 1.5:20 = 0.075



WireCast
Best Case: 1.5:1 = 1.5

Record Video

- AMPS Camera Operator
- Student Camera Operator
- Automated (No Camera Operator)

Record and Live Stream

- Wirecast (h.264 in Flash/mp4, Media IS Separatable)
- [a] Echo360 (Proprietary format in Flash, Media NOT Separatable, Playback via separate server)
- Matterhorn (h.264 in Flash/mp4, Open Source, Media IS Separatable)

The Play: Lear's Solo Dance in Costume

← Previous Chapter Next Chapter →

Lear Is Here dir. Wu Hsing-kuo, Taiwan, 2001

Notes:

Paragraph Font Family Font Size

email to: email these notes

Introduction

Wu begins with a 27-minute solo performance as King Lear dressed in a version of the traditional costume for the *lao sheng* role, as an old man of high authority, in beautiful

- Script
  - English
  - Chinese
- Interviews

Lon Capa Course Management

horizontal.problem (metadata)

Browsing resource, all submissions are temporary.

New Problem Variation Show All Foils

A mass of 0.16 kilogram can glide freely on an airtrack. It is attached to a spring (k=64 N/m) and oscillates back and forth with an amplitude of 0.3 meters. What is the kinetic energy at a distance of 0.1 meters from the equilibrium?

Submit Answer Tries 0/99

At t=0, the mass is found in the equilibrium position x=0 with a velocity of 6 m/s to the right. Which is the correct equation of motion?

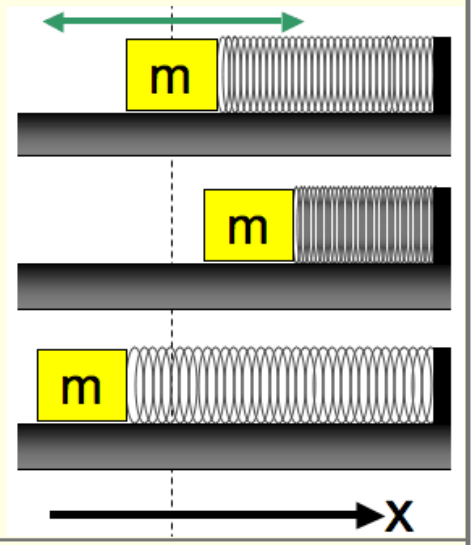
- $x(t)$=0.3m·cos(20rad/s·t)
- $x(t)$=0.3m·sin(20rad/s·t)
- $x(t)$=0.3m·sin(6rad/s·t)
- $x(t)$=6m·cos(20rad/s·t)
- $x(t)$=0.3m·cos(0.16rad/s·t)

Submit Answer Tries 0/2

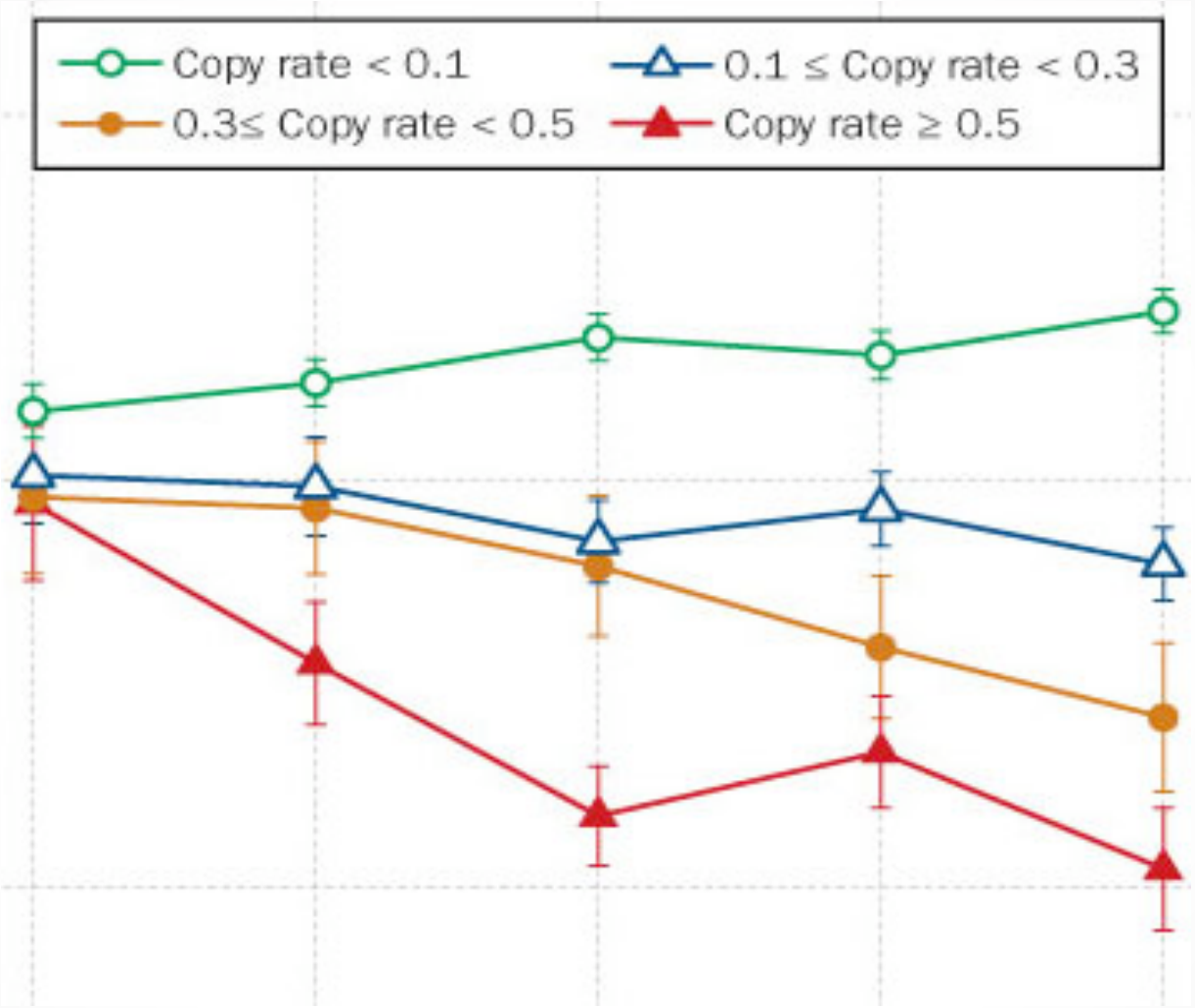
When does the oscillator have maximum acceleration?

- When its velocity is maximal
- When it is at the equilibrium position
- When its elongation is maximal

Submit Answer Tries 0/2

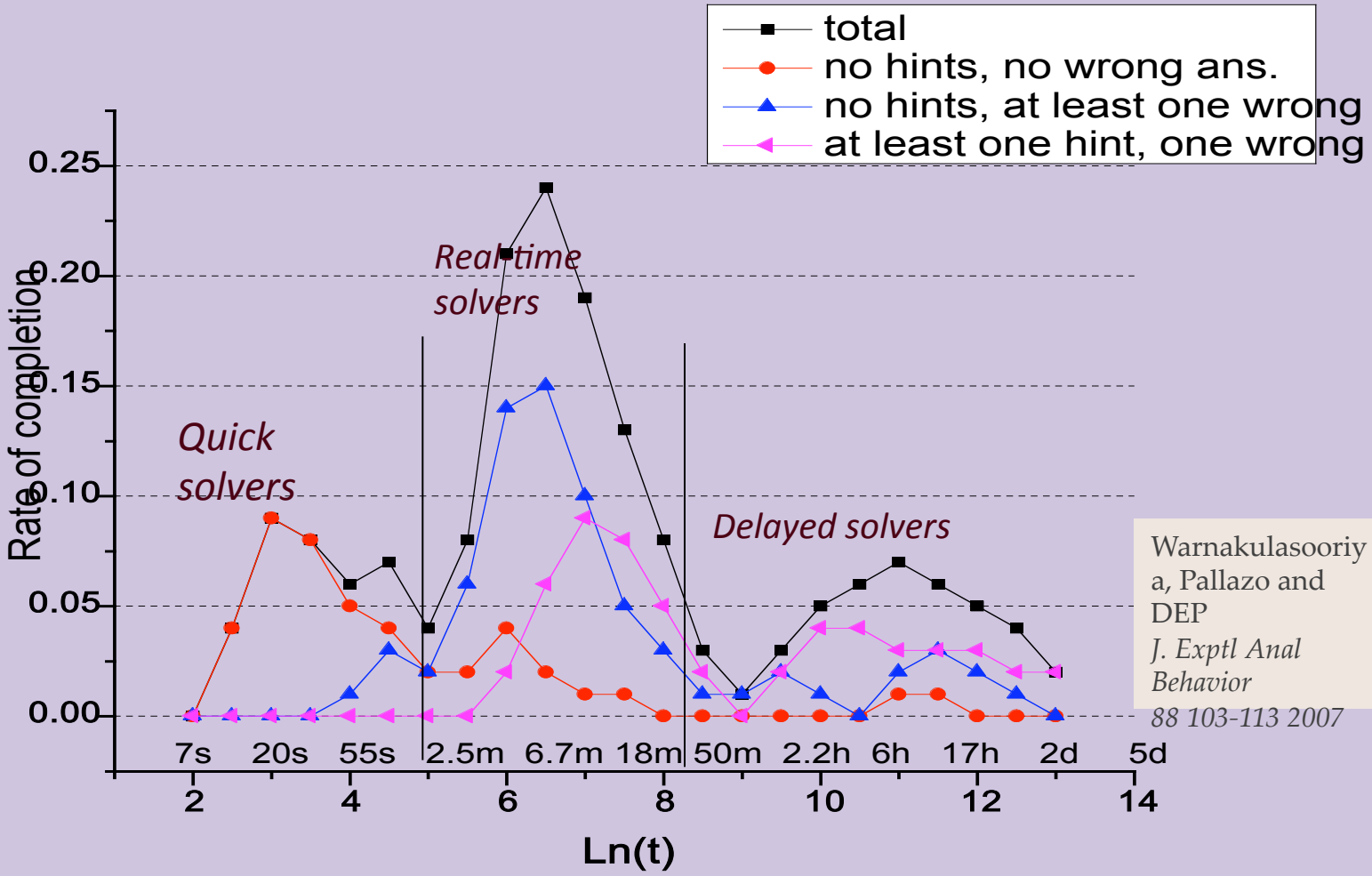


Copying Online Homework → Worse Grades



Net of 1.1 std dev for about 60% copying implies ~ 2.0 std. dev. effect size for *no copying* vs. *all copying*

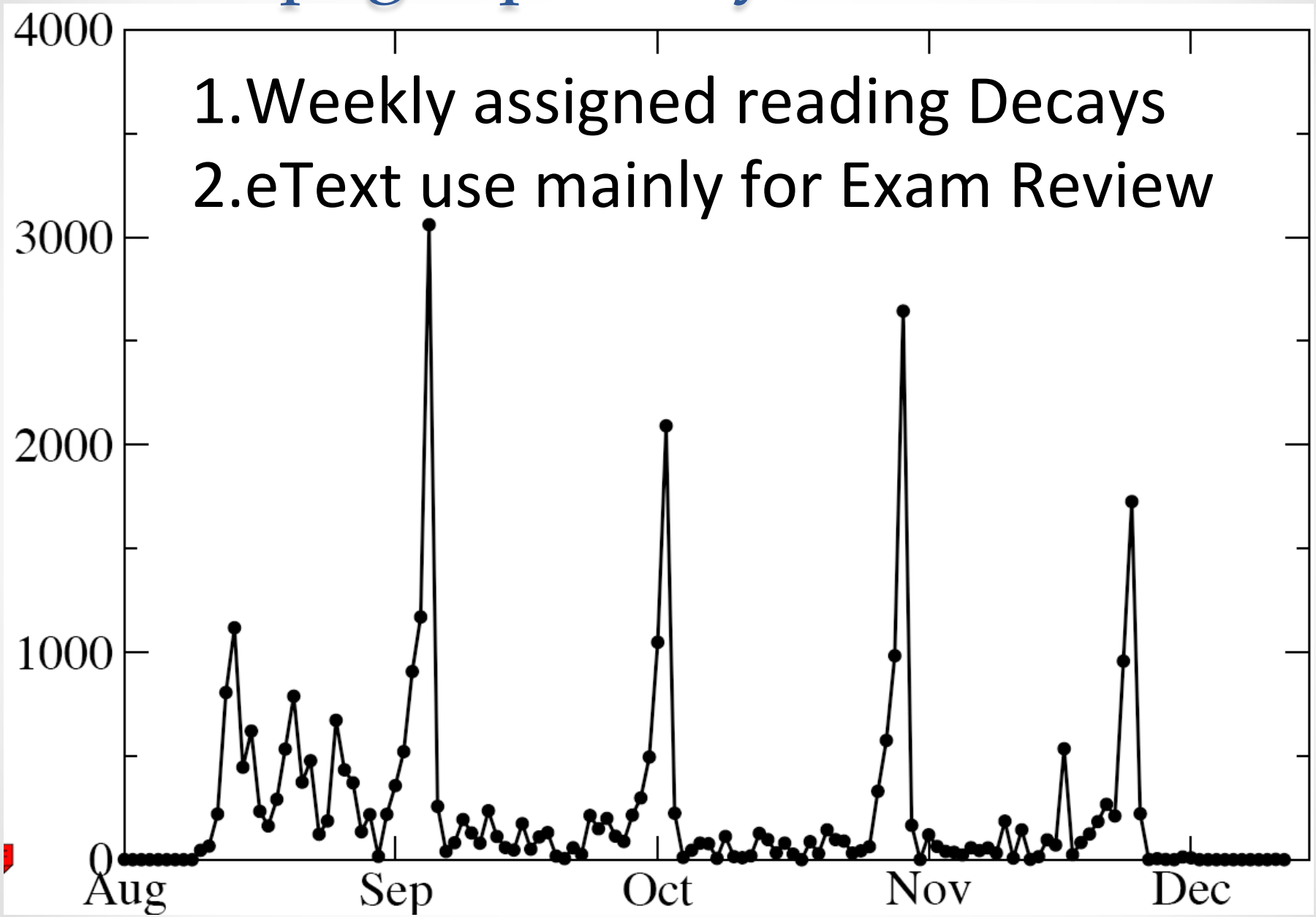
TIME Copying ← Quick, Correct Answer



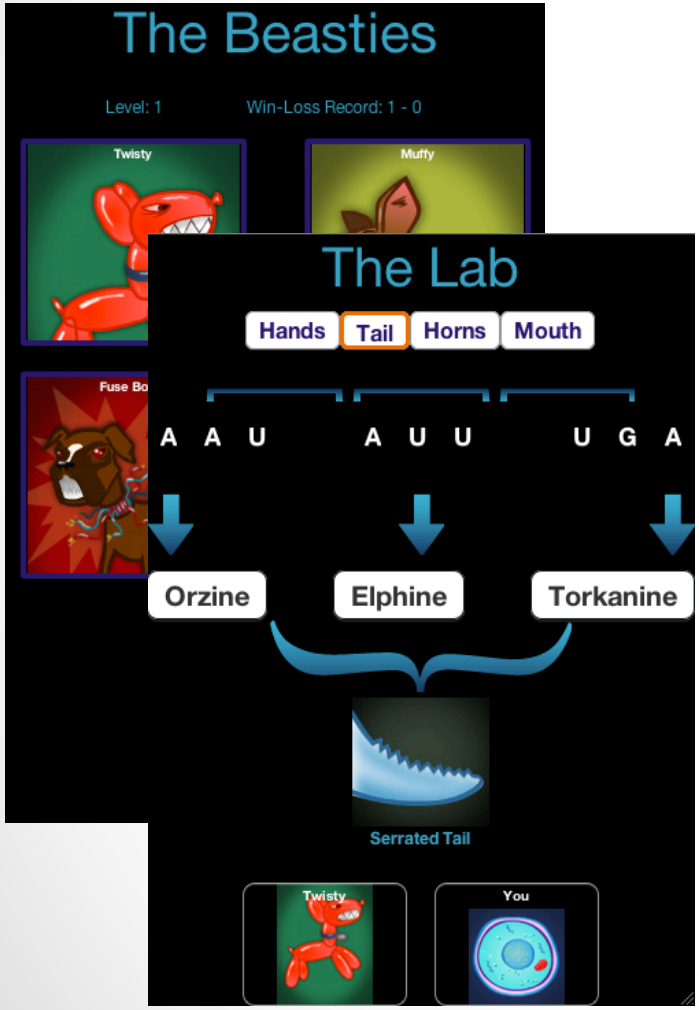
Warnakulasooriya, Pallazo and DEP
J. Exptl Anal Behavior
88 103-113 2007

1. Respond in <1 min – insufficient to read and answer
2. Correct on first try vs. 90% of remaining students

e-text pages per Day over semester



Games


The Beasties
Level: 1
Win-Loss Record: 1 - 0
Twisty
Muffy
The Lab
Hands
Tail
Horns
Mouth
A A U
A U U
U G A
Orzine
Elphine
Torkanine
Serrated Tail
Twisty
You


LEVELS
1
2
3
VOICE LOG
Yes Waker,
I remember that some PATHS are special:
x click to close x

STEMMMO


Tomato [Solanum lycopersicum]
Light
Sufficient light provides energy for fruit production
acidic
basic
IV I III VI V II
Zombie Drift
Projected
Last recorded zombie positions
Current zombie positions
sc1guy14
lovemutt
billybob
hedwick
hor3b
0.8m/s
0.1m/s
x3
billybob
ladyjane
hedwick
SAY
45/100
billybob Agh, zombie attack!
hedwick watch your mirrors. i had trouble here too
SAY Where is ladyjane when you need her??_
Quest Log
W
S

Game Analytics

Technologies

- Themes
  - We have many technologies already in R&D and use across campus (well beyond those presented today)
  - We also face issues in scaling and transfer across classes/domains