Welcome

LON-CAPA

11th Annual Workshop and Conference

2009

LON-CAPA Overview

- For some of you, this conference may be your first exposure to LON-CAPA
- Elevator-Version of LON-CAPA Project
- LON-CAPA is
  - free
  - open-source
  - a learning content management system
  - an assessment system

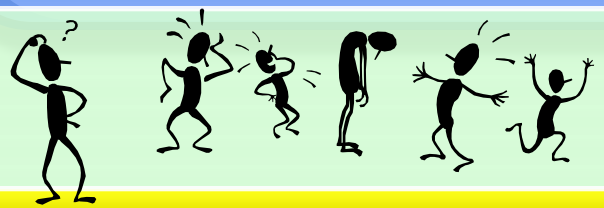
Free and Open-Source

- Free:
  - “Free beer”: no licensing fees
  - “Free speech”: source code, Bugzilla, mailing lists, research results, all out in the open
- Open-source: you can read, modify, improve, adapt, etc, the original code of the system

```
while ($line=<IN>) {
   chomp($line);
   $line=~s/\s+$//s;
   $line=~s/\"//g;
   $line=~tr/A-Z/a-z/;
   @entries=split(/\,/,$line);
   $username=$entries[4];
_
```

- BUT: derivative must be distributed under same license, i.e., GNU General Public License

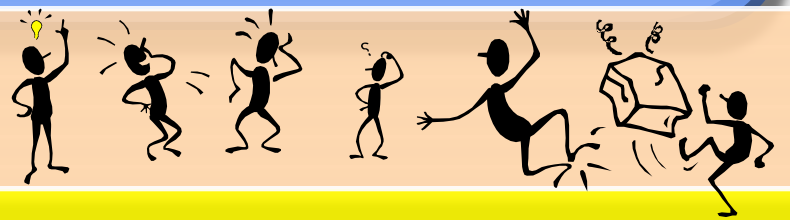
LON-CAPA Architecture



Course Management

Campus A

Resource Assembly



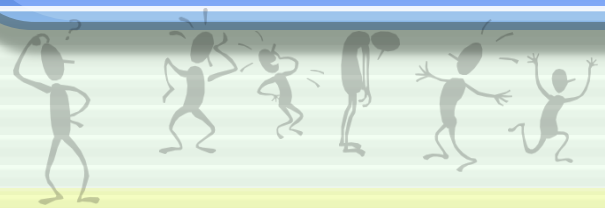
Course Management

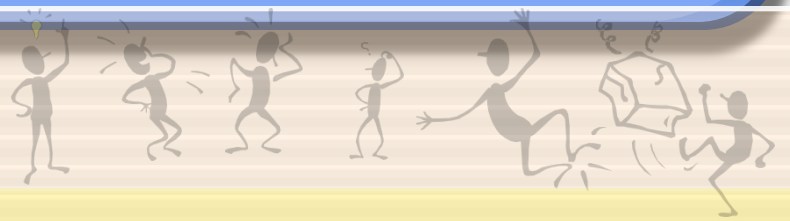
Campus B

Resource Assembly

Shared Cross-Institutional Resource Library

LON-CAPA Architecture





Course Management

Campus A

Resource Assembly

Course Management

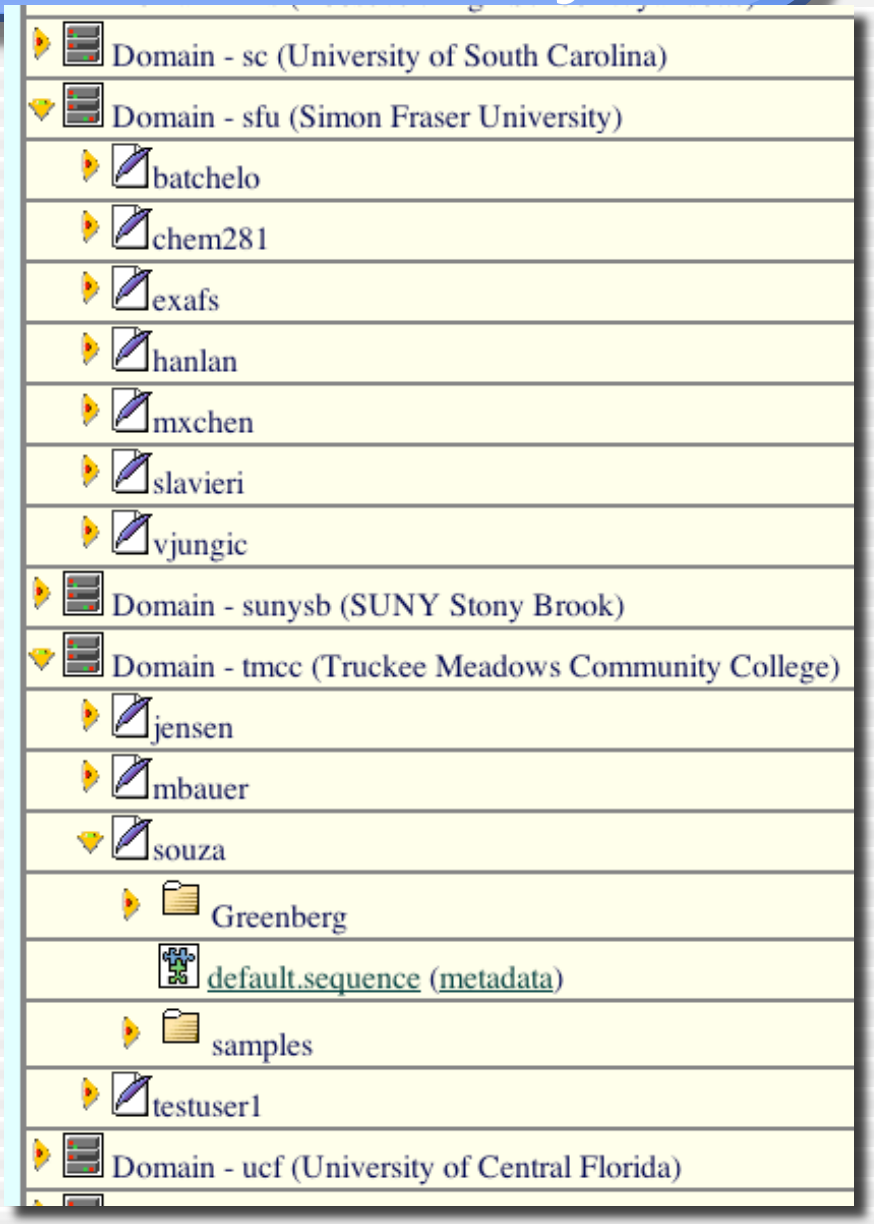
Campus B

Resource Assembly

Shared Cross-Institutional Resource Library

Shared Resource Library

- The distributed network looks like one big file system
- You can see each institution, the authors at that institution, and their resources



Shared Resource Library

- Resources may be web pages …

EXAMPLE

Example: Looping

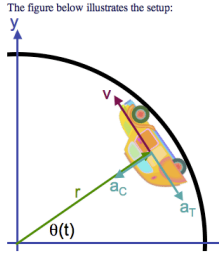
A toy car can go through a looping if it is fast enough. What are the forces that act on it? How fast does it have to be?

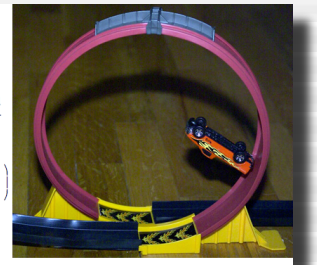
The motion is obviously circular, but non-uniform: the car will slow down on the way up, and speed up on the way down. With r being the radius of the looping, the x-axis horizontal, the y-axis pointing up, the origin being in the center of the looping, and $\theta(t)$ being the angle, the position of the car is given by

$$\vec{r}\,(t) = \begin{pmatrix} r\cos(\theta(t)) \\ r\sin(\theta(t)) \end{pmatrix}$$

as long as it does not fall off the track.

The figure below illustrates the setup:

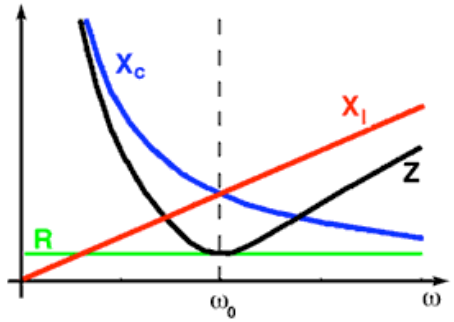




Impedance

The addition of the three currents (through the resistor, the inductance, and the capacitance), each of which is 90° out of phase with each other, in quadrature yields:

$$\begin{aligned} V &= \sqrt{V_R^2 + (V_C - V_L)^2} \\ &= \sqrt{(I\,R)^2 + (I\,X_C - I\,X_L)^2} \\ &= I\sqrt{R^2 + (X_C - X_L)^2} \\ &= I\,Z \end{aligned}$$



where I is the current, X_C and X_L are the capacitive and inductive reactances, respectively, and Z is the impedance. Putting in the values of the reactances, we obtain for Z:

$$\begin{aligned} Z = \frac{V}{I} &= \sqrt{R^2 + (X_C - X_L)^2} \\ &= \sqrt{R^2 + \left(\frac{1}{\omega C} - \omega L\right)^2} \\ &= \sqrt{R^2 + \left(\frac{1}{2\pi f C} - 2\pi f L\right)^2} \end{aligned}$$

nd has its minimum of Z = R when

$$\omega_0 = (LC)^{-1/2},$$

pure LC circuit. This is the resonance frequency of the RLC circuit. The dance and of the reactances is shown in the figure.

ave to be added in a special way. They end up as a single quantity Z, the alent of the resistance.

EXAMPLE

Focal Length

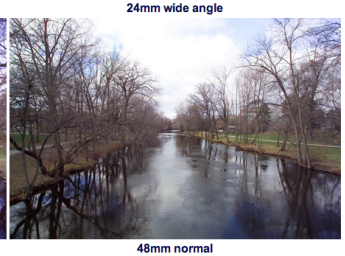
The following pictures are taken from the same vantage point with three different zoom lenses:

- 17mm-35mm wideangle zoom
- 24mm-70mm normal zoom
- 70mm-300mm tele zoom

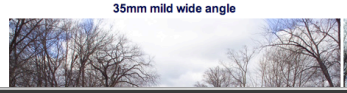
using a digital camera with an image sensor of 24mm x 36mm (standard so-called 35mm image format).

17mm extreme wide angle

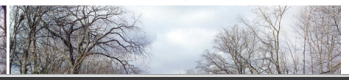
24mm wide angle



35mm mild wide angle

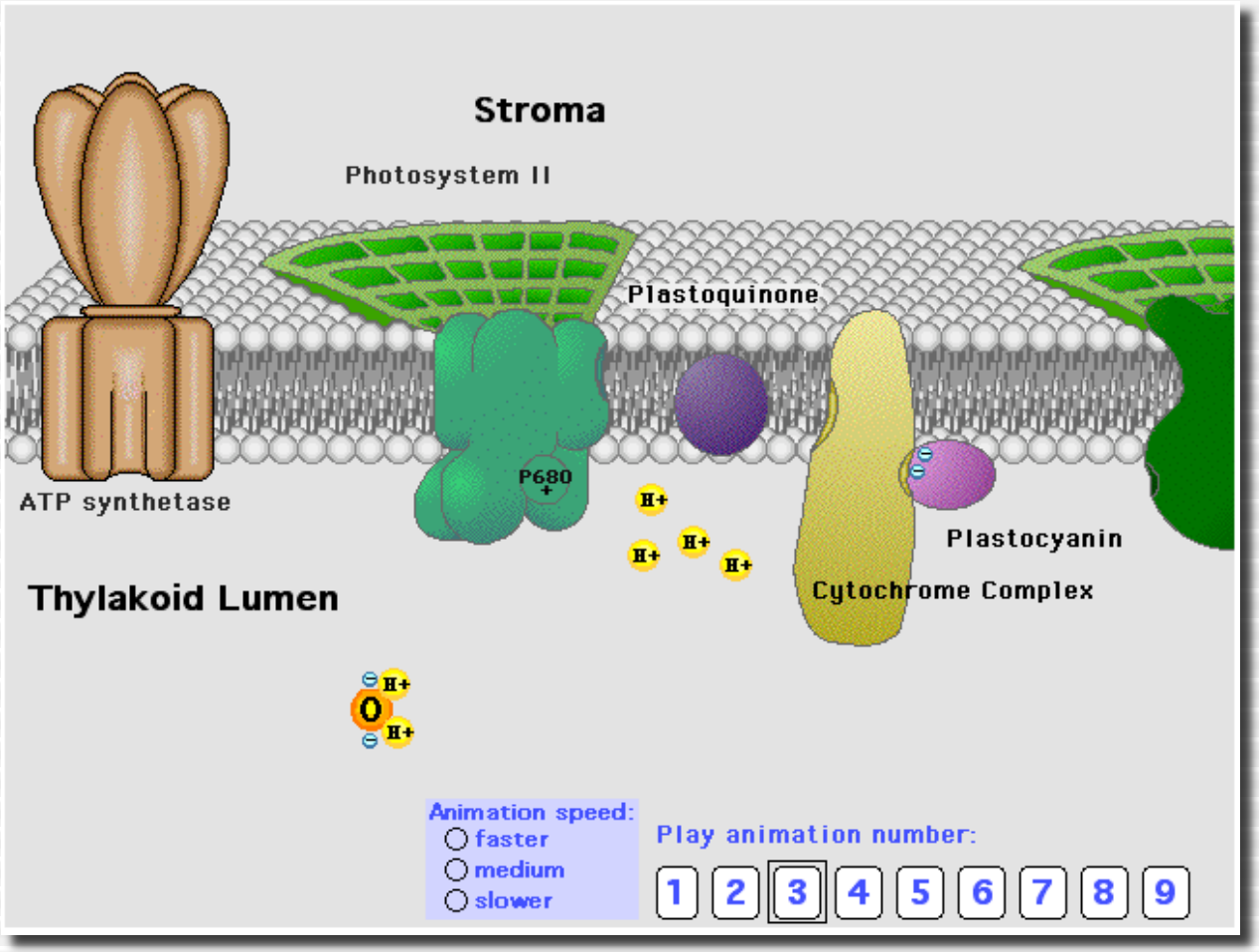


48mm normal



Shared Resource Library

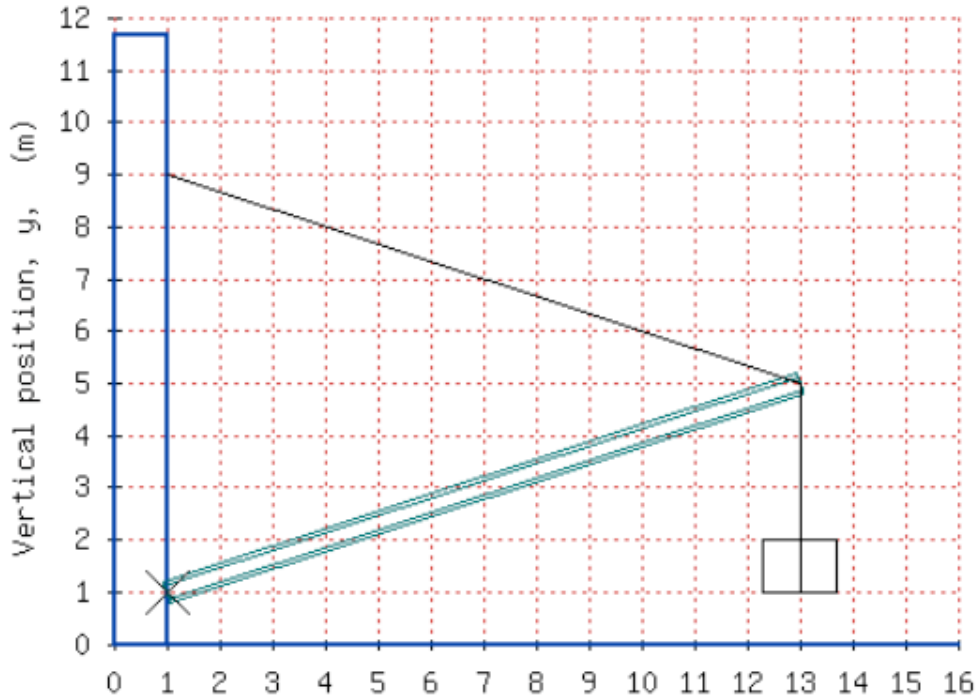
- … or simulations and animations …



Shared Resource Library

- … or this kind of randomizing online problems

A crate with a mass of 155.5 kg is suspended from the end of a uniform boom with mass of 89.5 kg. The upper end of the boom is supported by a cable attached to the wall and the lower end by a pivot (marked X) on the same wall. Calculate the tension in the cable.



Shared Resource Library

- …special emphasis on math

What is the derivative of

$$\begin{pmatrix} 4t^3 \\ 8t^8 \end{pmatrix}$$

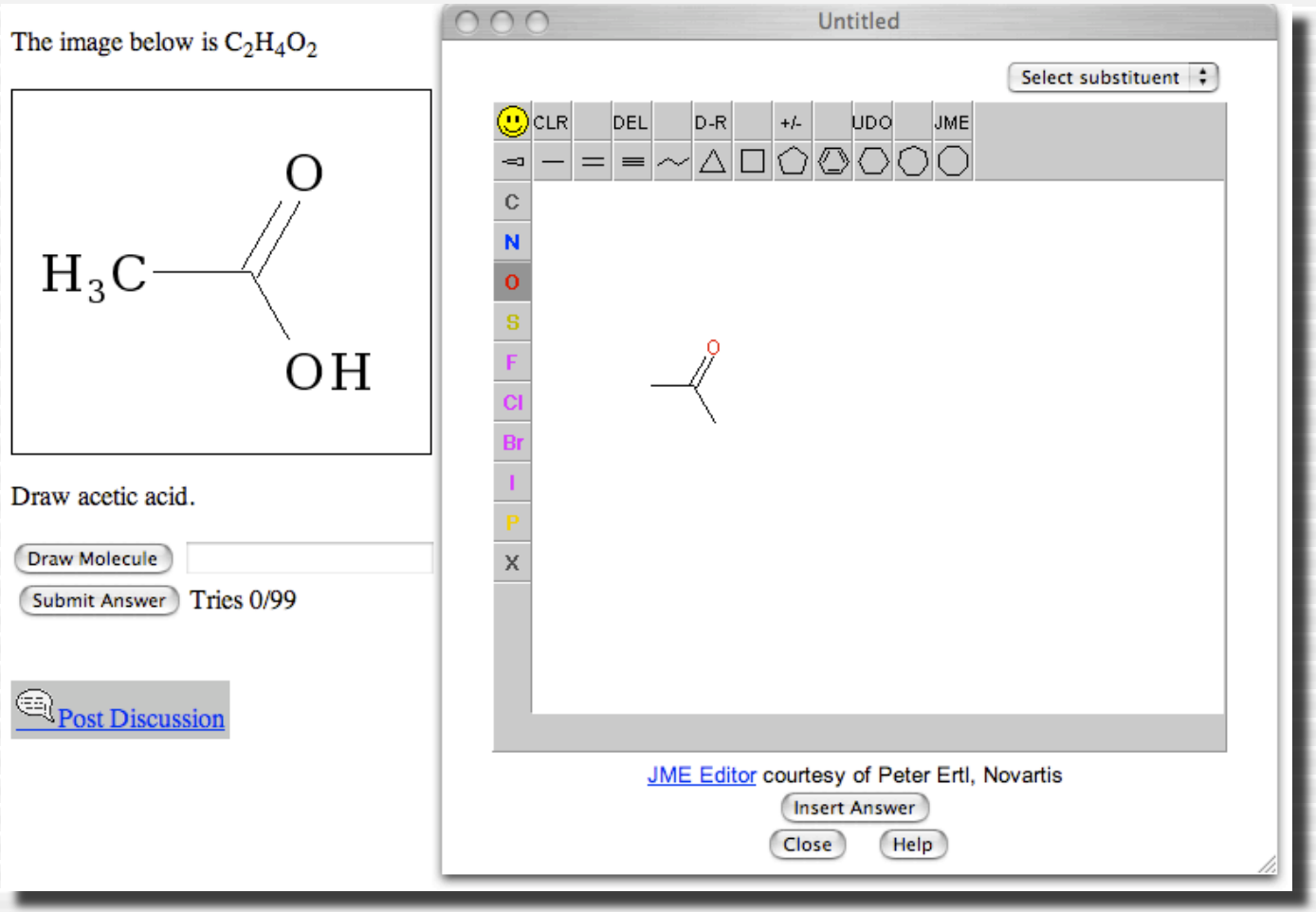
with respect to t? 4t^2,8t^7

You need to multiply with the original exponent.

Submit Answer Incorrect. Tries 1

Shared Resource Library

- … chemistry …



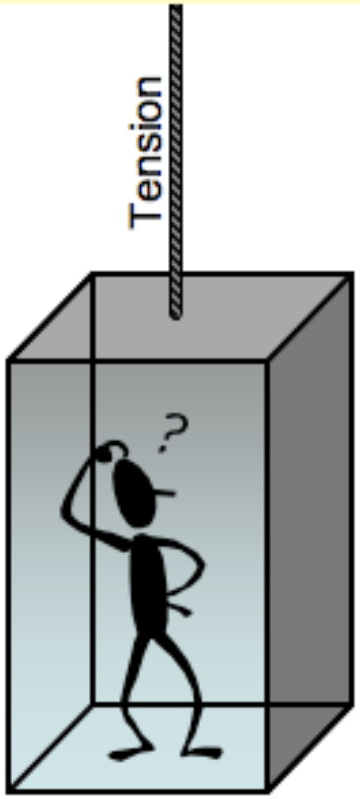
Shared Resource Library

- … physical units …

Elevator Problem Due never

An elevator (cabin mass 500 kg) is designed for a maximum load of 2600 kg, and to reach a velocity of 3 m/s in 5 s. For this scenario, what is the tension the elevator rope has to withstand? 32270 kg*m/s^2

Submit Answer Tries 0/99

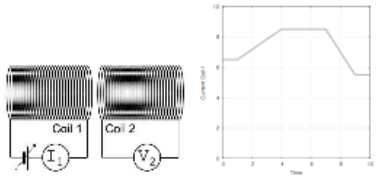


Shared Resource Library

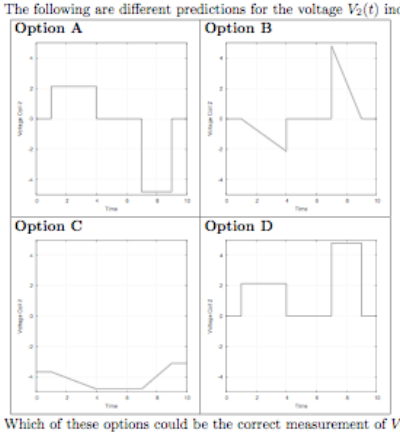
- Dynamic Graphing

Gerd Kortemeyer

Two short coils are located close to each other as shown below. The current $I_1(t)$ through Coil 1 is variable and shown as a function of time in the plot below.



The following are different predictions for the voltage $V_2(t)$ induced in Coil 2.



Which of these options could be the correct measurement of $V_2(t)$?

A. Option A
B. Option B
C. Option C
D. Option D

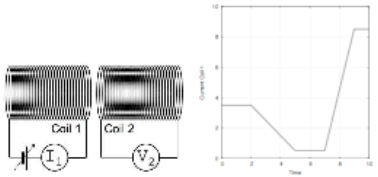
Which one of the following actions would result in a higher magnitude of the peak voltage across the Coil 2?

A. Placing the whole apparatus into a medium with lower permeability.
B. Increasing the current through Coil 1 by a constant positive offset ΔI, i.e., $I_1'(t) = I_1(t) + \Delta I$.
C. Decreasing the number of turns of Coil 1.
D. Changing the current through Coil 1 more rapidly.
E. Decreasing the number of turns of Coil 2.

If Coil 1 has 180 turns, and Coil 2 has 380 turns, and if a current of $I_1 = 3A$ through Coil 1 results in an average flux of $\Phi_2 = 0.08Tm^2$ inside Coil 2, what is the mutual inductance? [ ]
Now the coils are moved closer together, so that the new mutual inductance is 68 H. What is the magnitude of the induced voltage V_2 while I_1 is at a constant 3A? [ ]
Using the same setup with a mutual inductance of 68 H, what is the magnitude of the induced voltage V_2 if I_1 increases with $5A/s$? [ ]

Gerd Kortemeyer

Two short coils are located close to each other as shown below. The current $I_1(t)$ through Coil 1 is variable and shown as a function of time in the plot below.



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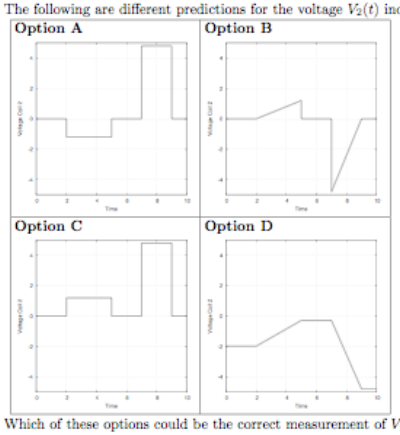

Which of these options could be the correct measurement of $V_2(t)$?

A. Option A
B. Option B
C. Option C
D. Option D

Which one of the following actions would result in a higher magnitude of the peak voltage across the Coil 2?

A. Decreasing the number of turns of Coil 1.
B. Placing the whole apparatus into a medium with lower permeability.
C. Decreasing the number of turns of Coil 2.
D. Increasing the current through Coil 1 by a constant positive offset ΔI, i.e., $I_1'(t) = I_1(t) + \Delta I$.
E. Changing the current through Coil 1 more rapidly.

If Coil 1 has 190 turns, and Coil 2 has 370 turns, and if a current of $I_1 = 3A$ through Coil 1 results in an average flux of $\Phi_2 = 0.07Tm^2$ inside Coil 2, what is the mutual inductance? [ ]
Now the coils are moved closer together, so that the new mutual inductance is 50 H. What is the magnitude of the induced voltage V_2 while I_1 is at a constant 3A? [ ]
Using the same setup with a mutual inductance of 50 H, what is the magnitude of the induced voltage V_2 if I_1 increases with $2A/s$? [ ]

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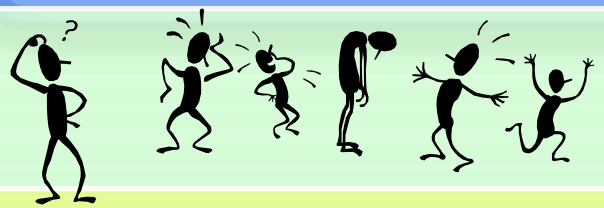
LON-CAPA Architecture



Course Management

Campus A

Resource Assembly

Course Management

Campus B

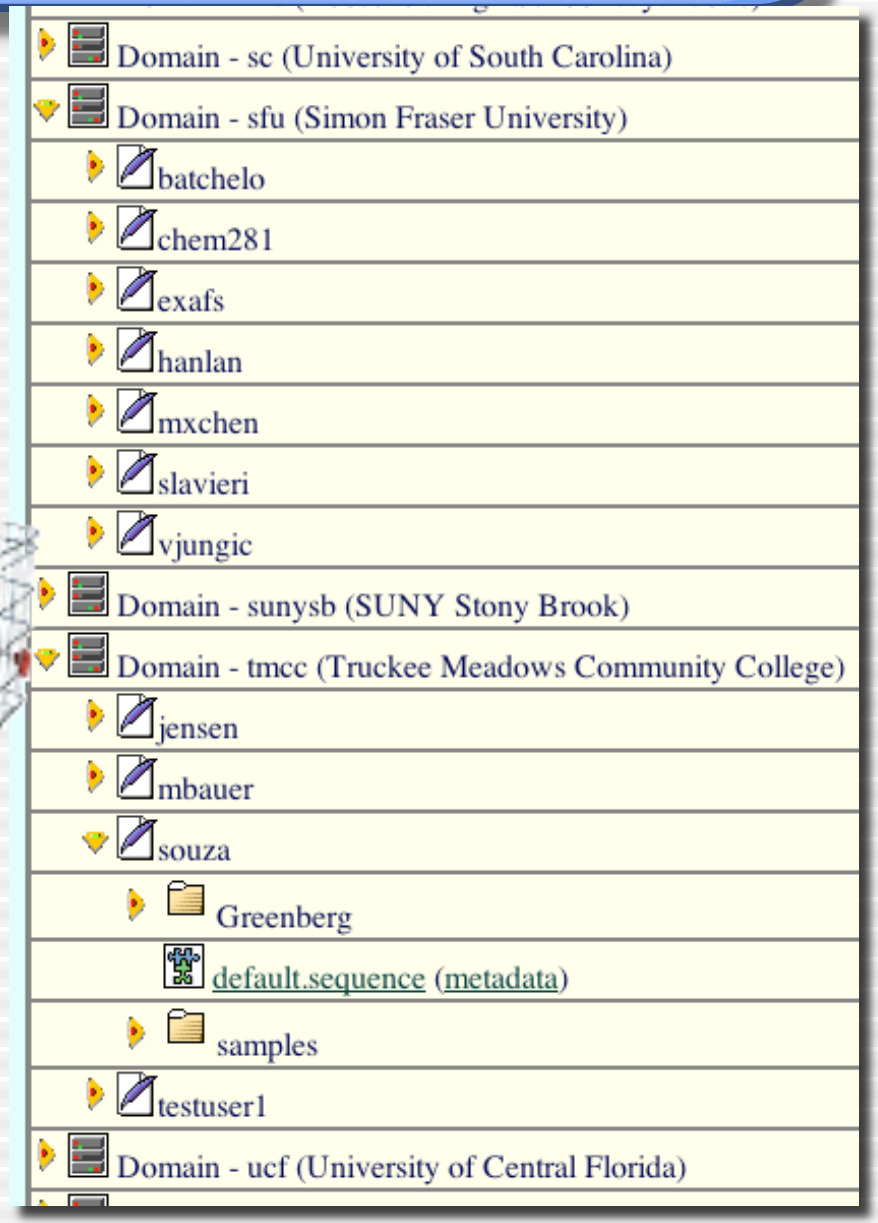
Resource Assembly

Shared Cross-Institutional Resource Library

Resource Assembly

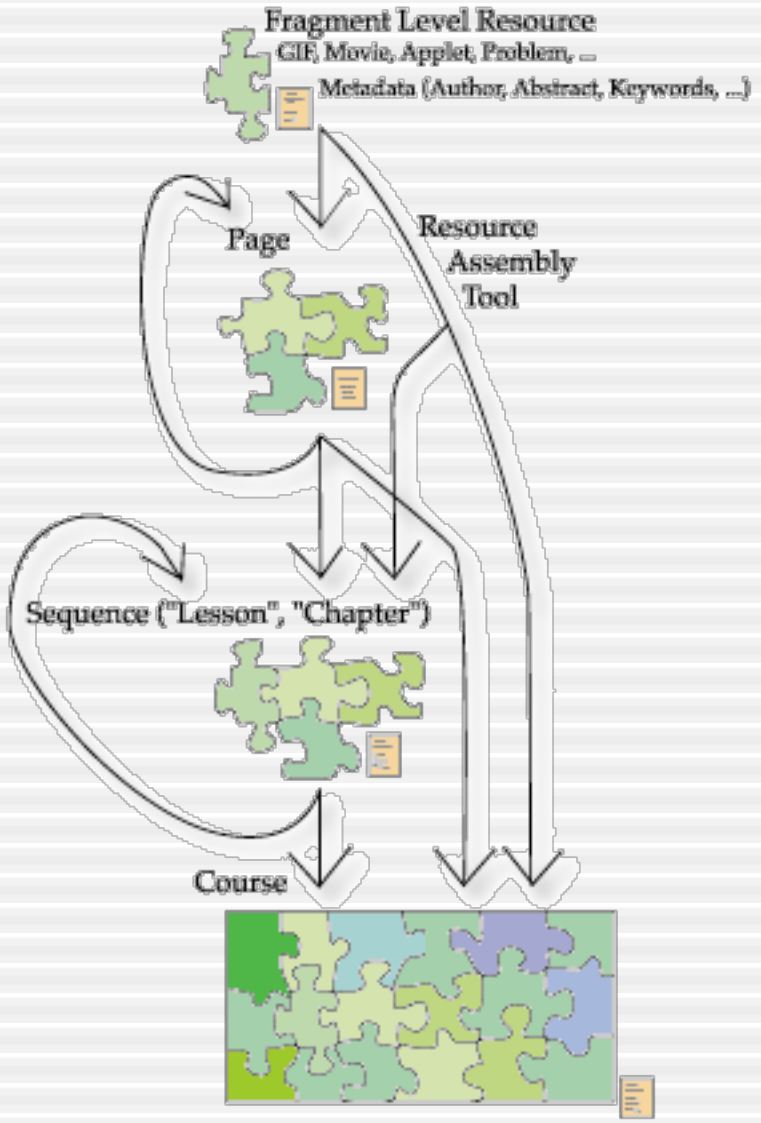
- Shopping Cart

"Supermarket"

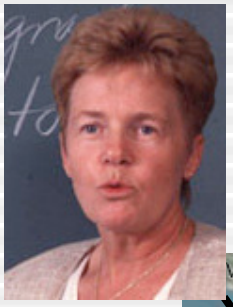


Resource Assembly

- Nested Assemblies
- No pre-defined levels of granularity („module“, „chapter“, etc)
- People can never agree what those terms mean
- Re-use possible on any level

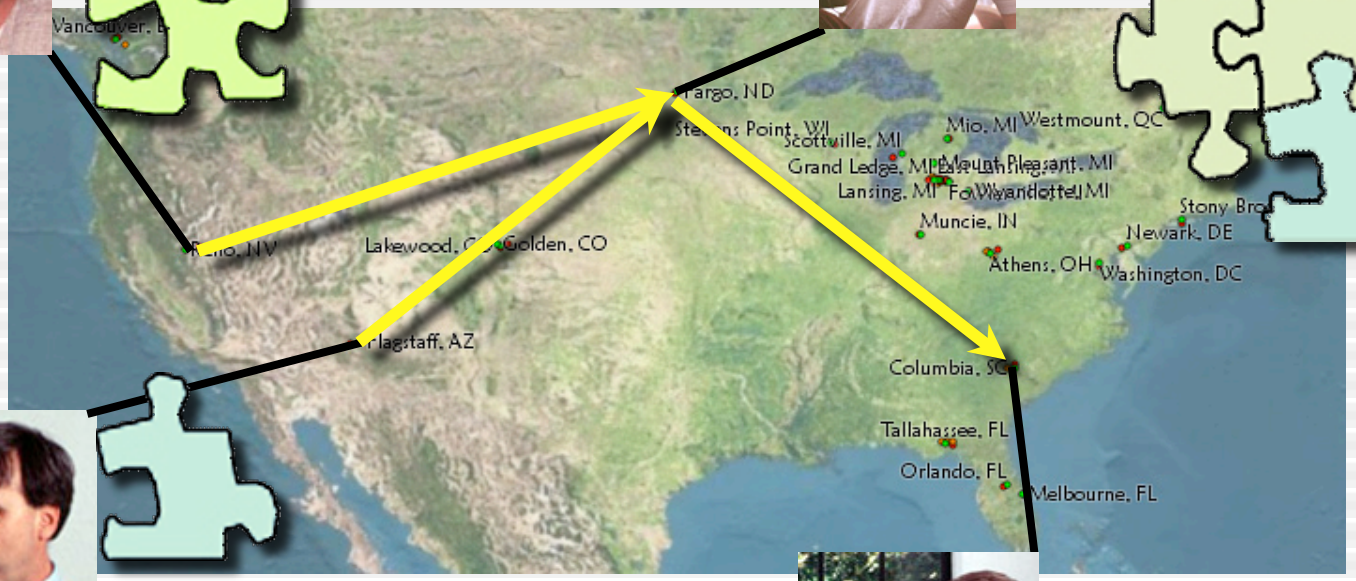


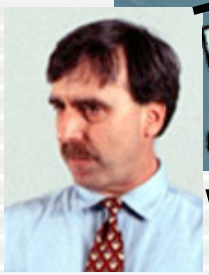
Resource Assembly



Writes module about energy conservation

Compiles modules about conservation laws

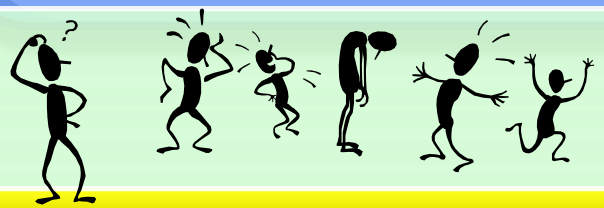




Writes module about momentum conservation

Uses whole assembly in his course

LON-CAPA Architecture



Course Management

Campus A

Resource Assembly

Course Management

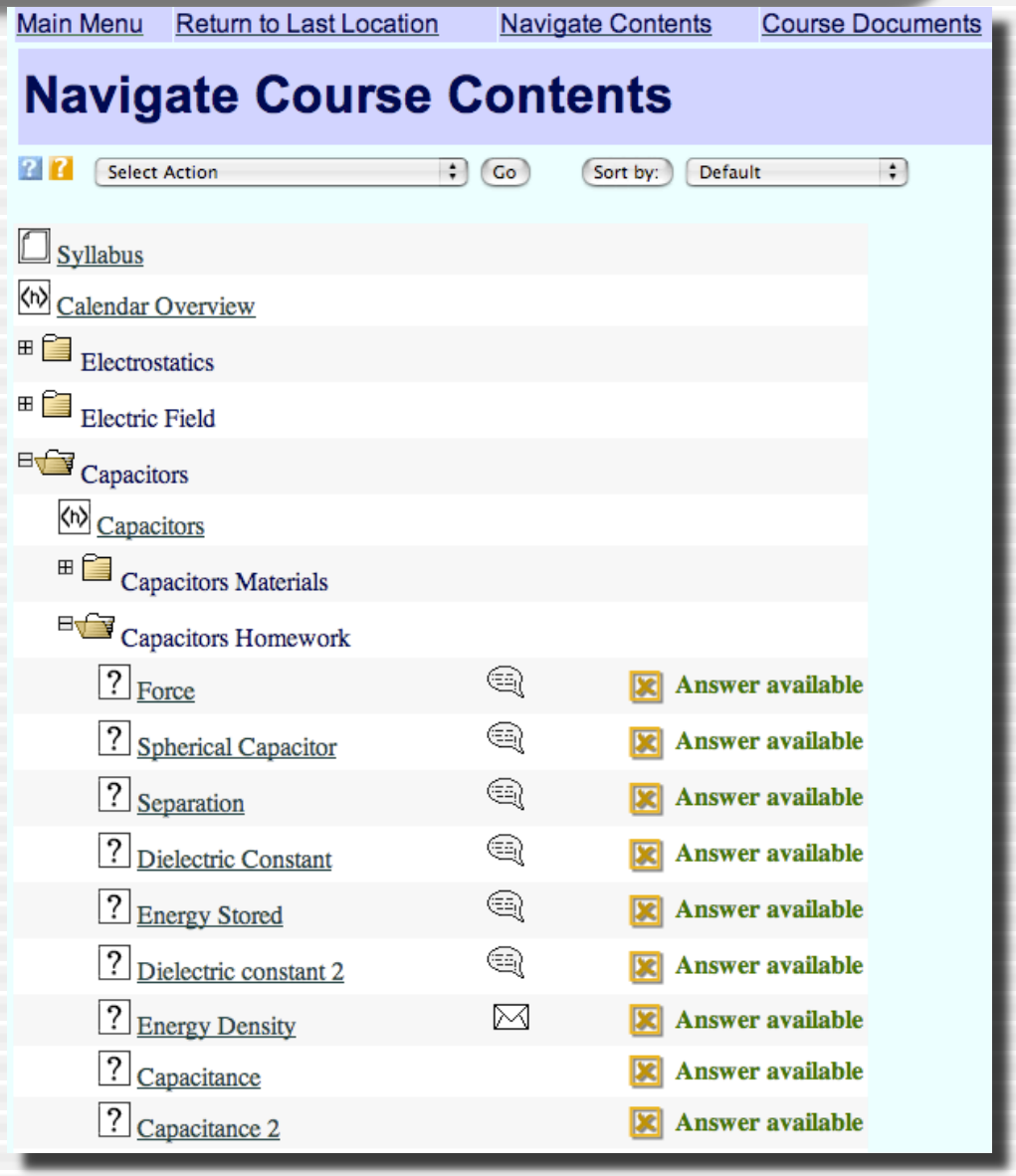
Campus B

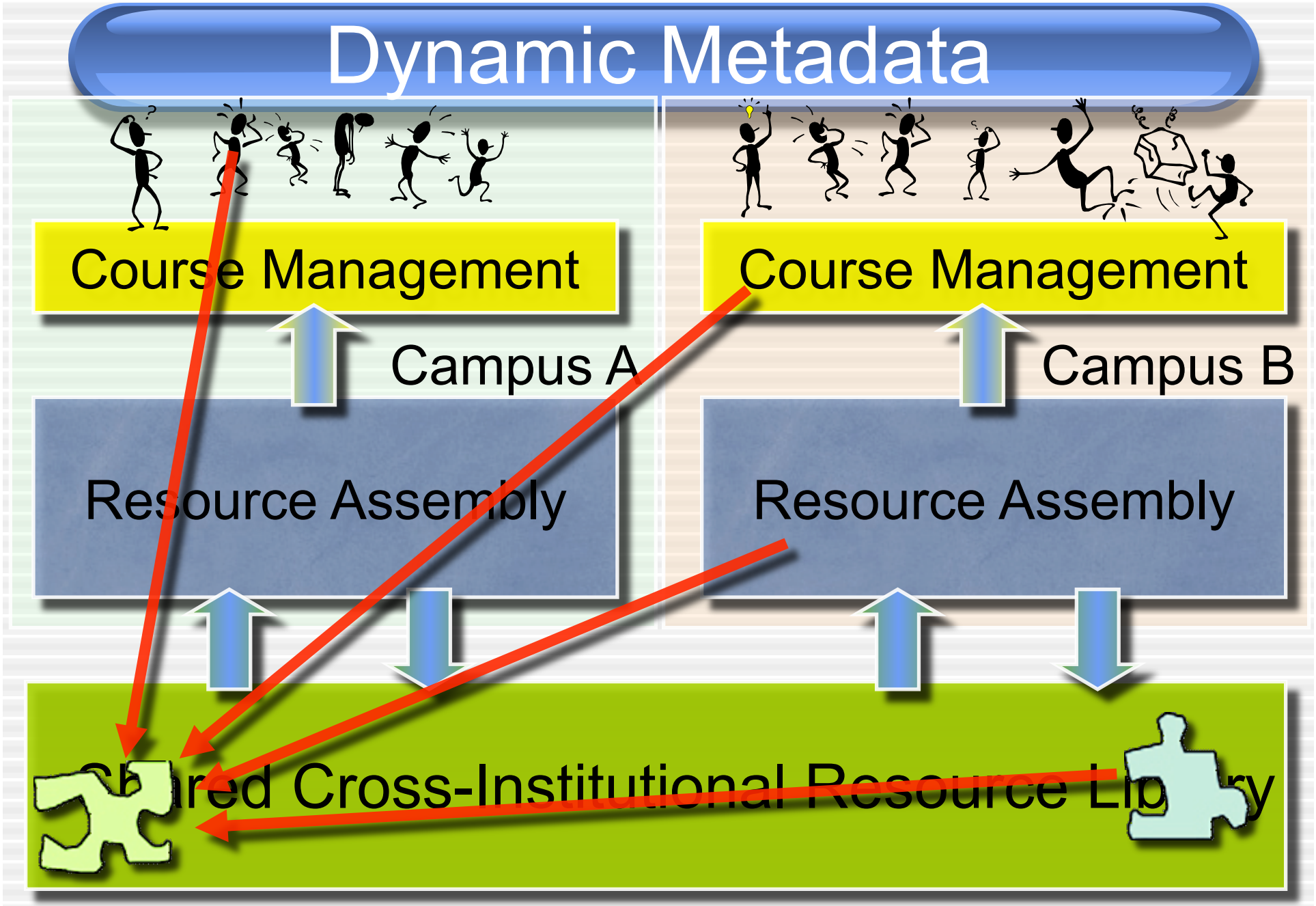
Resource Assembly

Shared Cross-Institutional Resource Library

Course Management

- Instructors can directly use the assembled material in their courses
  - navigational tools for students to access the material
  - grade book
  - communications
  - calendar/scheduling
  - access rights management
  - portfolio space




Dynamic Metadata
Course Management
Course Management
Campus A
Campus B
Resource Assembly
Resource Assembly
Shared Cross-Institutional Resource Library

Dynamic Metadata

- Dynamic metadata from usage
- Assistance in resource selection („amazon.com“)
- Quality control

Access and Usage Statistics

Network-wide number of accesses (hits)	890
Number of resources using or importing resource	1 • Eukaryotic Gene Control [msu/bio/Gene_Expr/111f03GeneCntrl.sequence]
Number of resources that lead up to this resource in maps	1 • Back to the Original Question [msu/bio/Gene_Expr/problems/originalquestion.problem]
Number of resources that follow this resource in maps	1 • Eukaryotic vs Prokaryotic Gene Expression II [msu/bio/Gene_Expr/problems/eukvsprokII.problem]
Network-wide number of courses using resource	3 • LBS 145 - Spring 2004 • ZOL 341 - Fall 2003 • BS 111 - Fall 2003

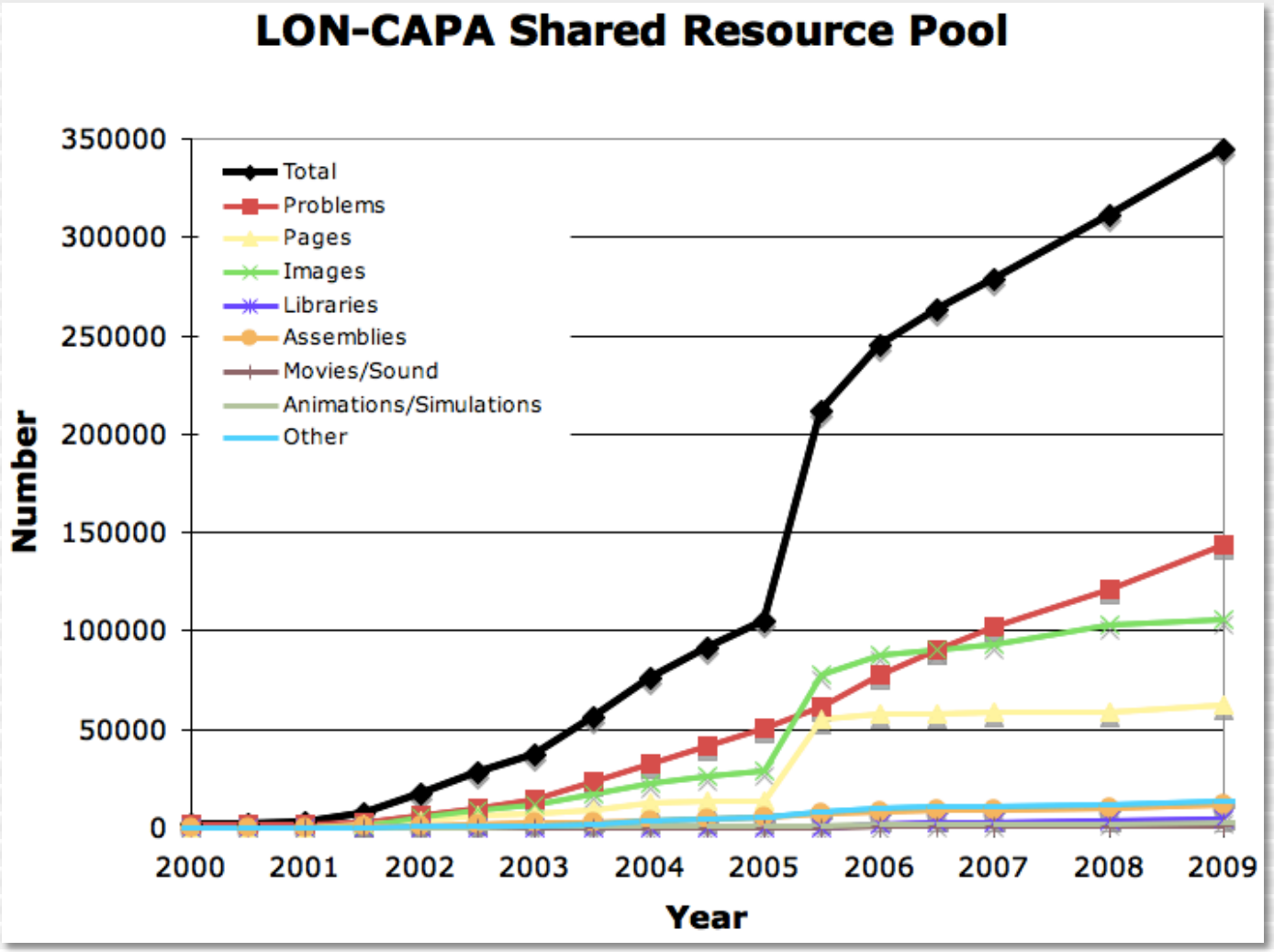
Assessment Statistical Data

Total number of students who have worked on this problem	291
Average number of tries till solved	1.37
Degree of difficulty	(0.36)

Recent Developments

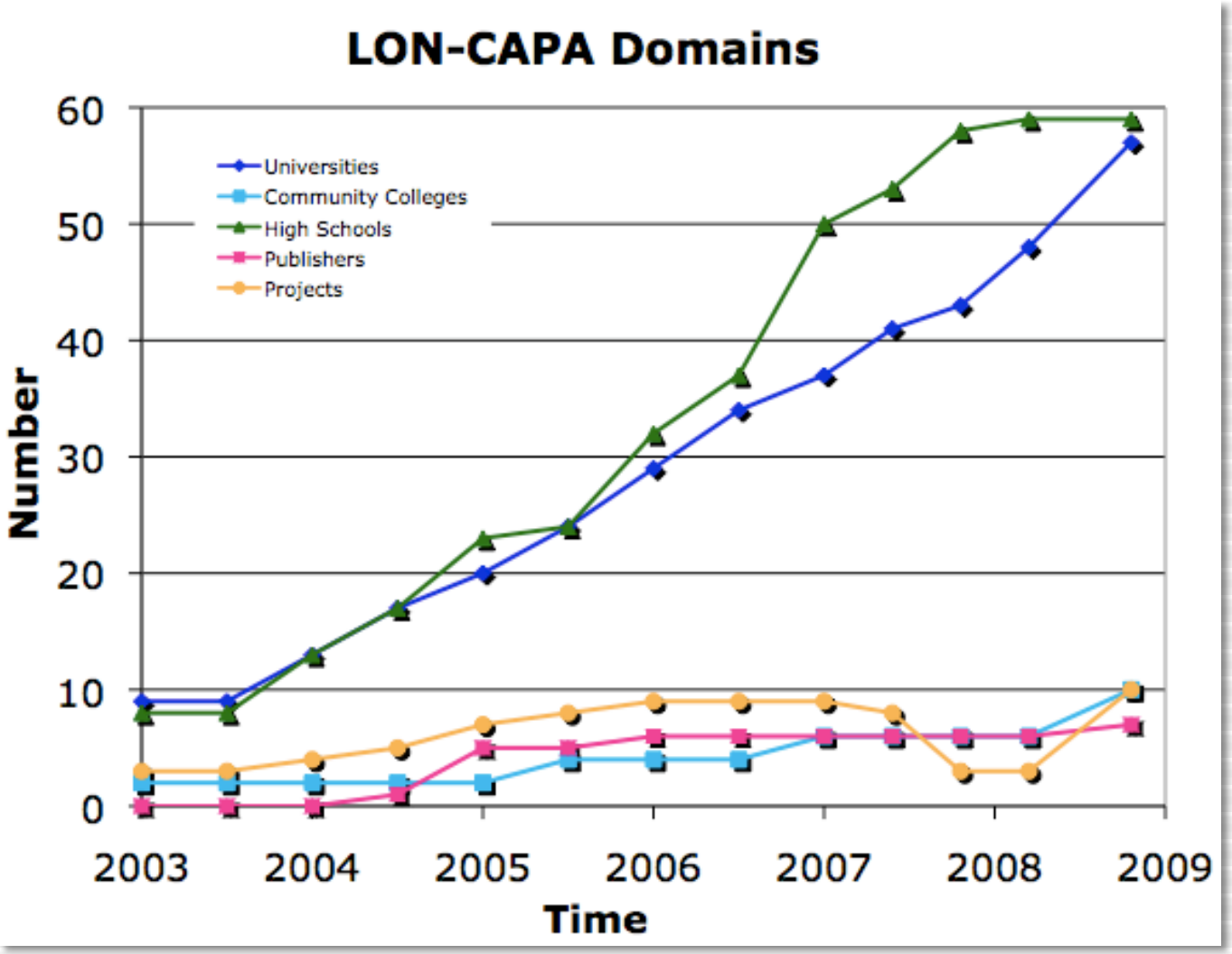
The LON-CAPA Community

- Shared content repository with over 340,000 resources



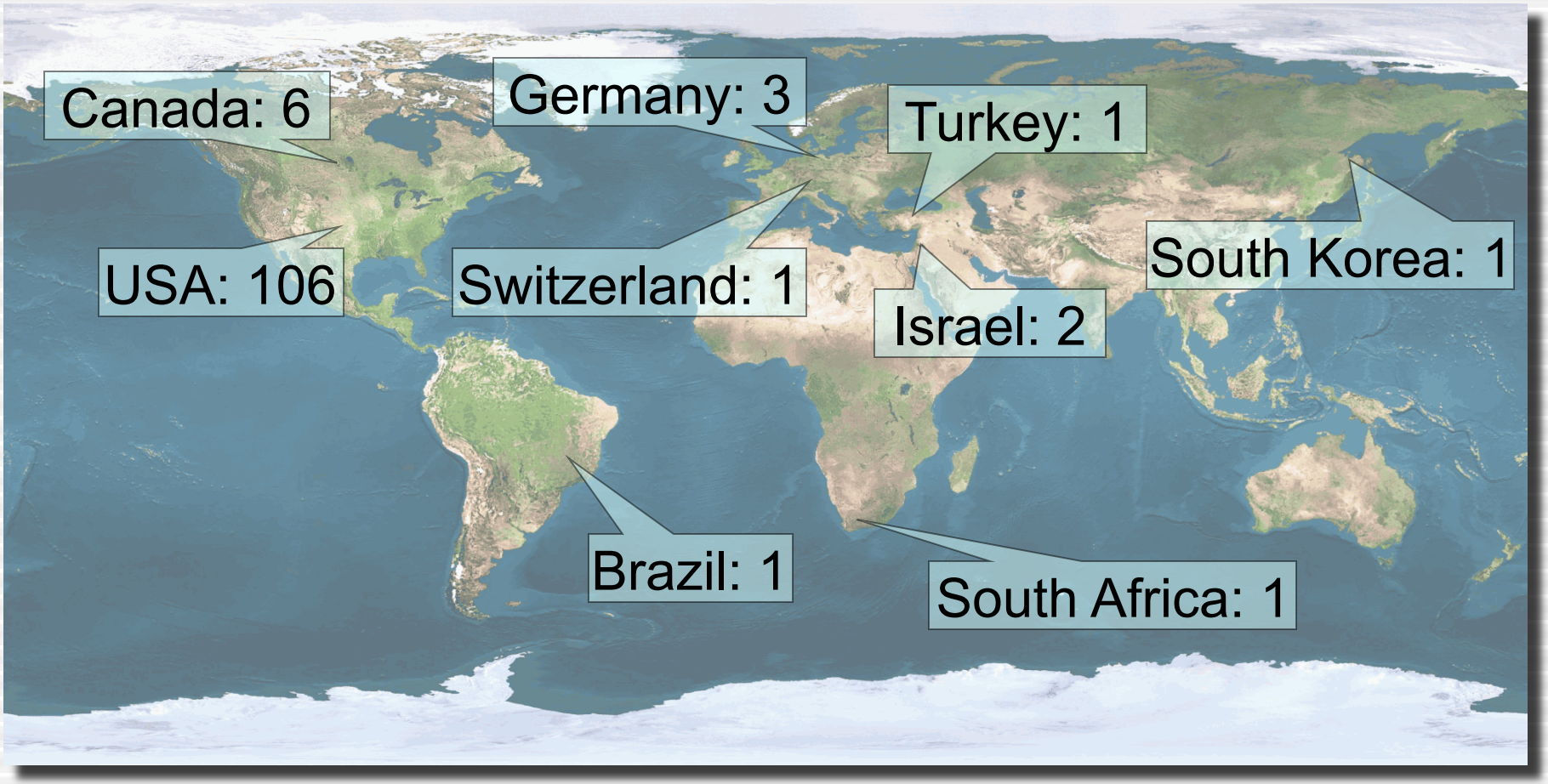
The LON-CAPA Community

- 130 institutions in total



The LON-CAPA Community

High Schools, Colleges, and Universities



… plus grant projects and publishing companies.

The Consortium

- Long-Term Sustainability of the Project
- Currently three member institutions:
  - Simon Fraser University
  - University of Illinois at Urbana-Champaign
  - Michigan State University
- Possibly two additional members soon

Year in Review

- What happened since our last meeting at Simon Fraser University?

2.7

- Version 2.7, Sept. 1st 2008
  - Course coordinators see recent enrollment changes on the "What's New" screen.
  - After cloning a course, Course Coordinators can shift all dates and times at once to adjust to a new semester or year.
  - Course Coordinators can switch roles on-the-fly to test their courses from the perspective of students, instructors, and teaching assistants.

2.7

- 2.7 cont.
  - The DragMath editor was incorporated into algebraic and formula response problems.
  - Students can now self-enroll into designated courses, and the process can be coupled with other institutional authentication and authorization system

2.8

- Version 2.8, Jan. 20th 2009
  - Files uploaded by students for submission to assignments are subject to a size restriction.
  - The assigned quota and the amount of disk space currently in use for the user's Portfolio are displayed.
  - The zip-file that instructors can download with all files submitted by students to a particular assignment now includes files uploaded directly as well as files selected from Portfolios.

2.8

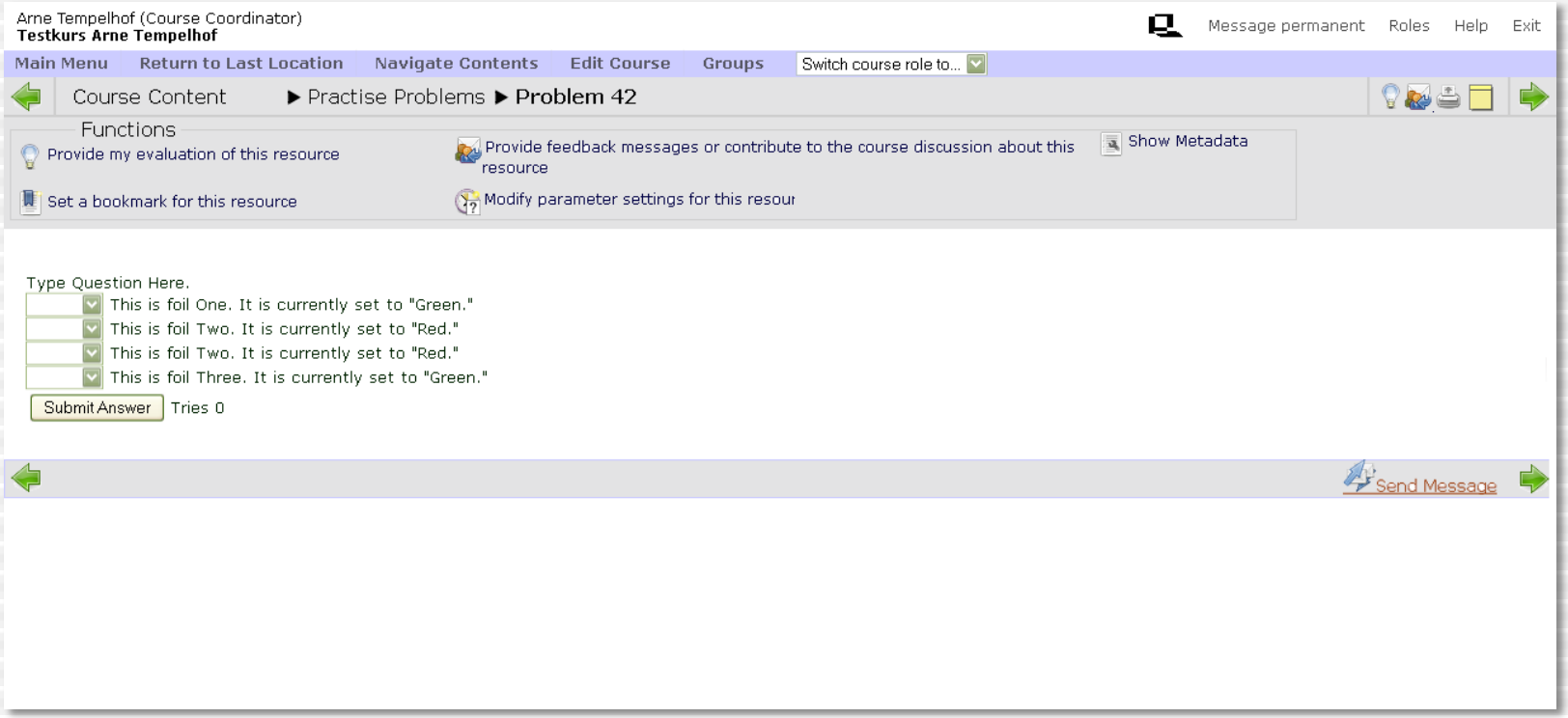
- 2.8 cont.
  - System-generated text in a notification email is localized according to the recipient's or course language preference.
  - The starting day of the week used in the calendar is determined by locale.

2.9

- Version 2.9 is already branched.
- Anticipated:
  - Additional work on import from other course management systems
  - Support for the “R” statistical package along the lines or Maxima
  - Enhanced logging and editor for slot reservations
  - Enhanced self-enrollment and course request system
  - Wider use of WYSIWYG editor
- More details tomorrow.

3.0

- Work for version 3.0 is already under way.
- Some significant interface redesign work.
- Again, more details tomorrow.

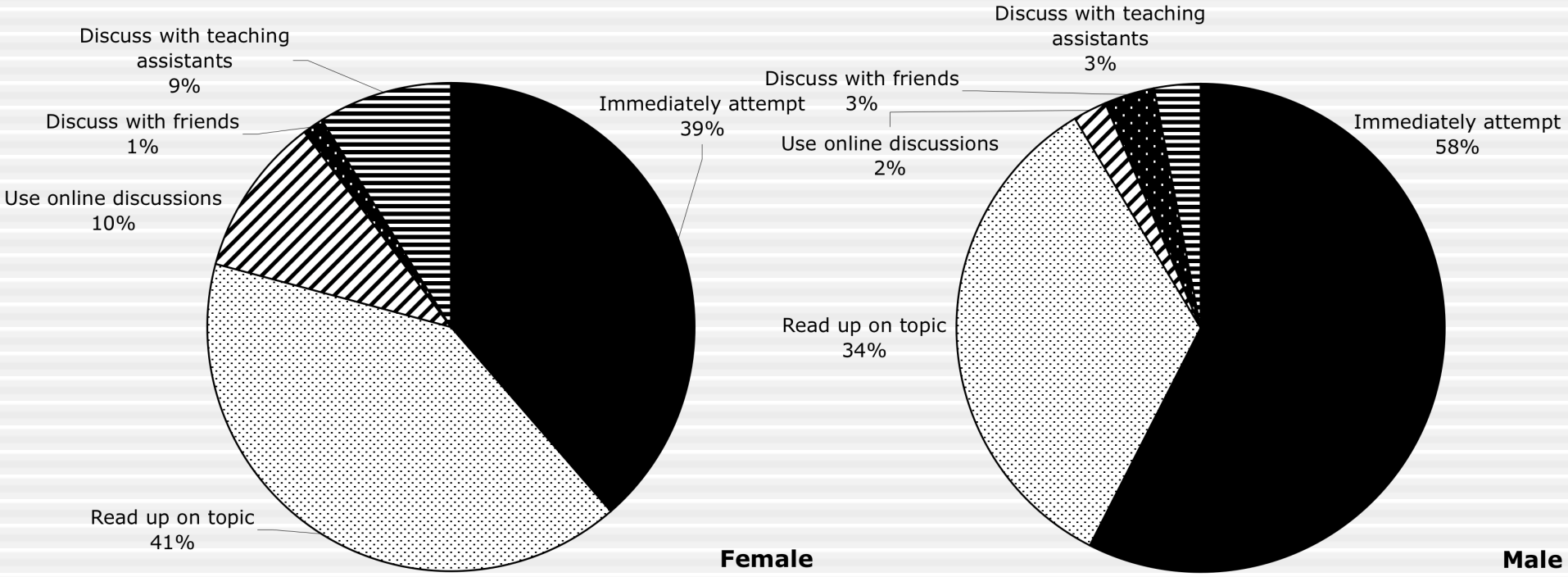


Scholarship

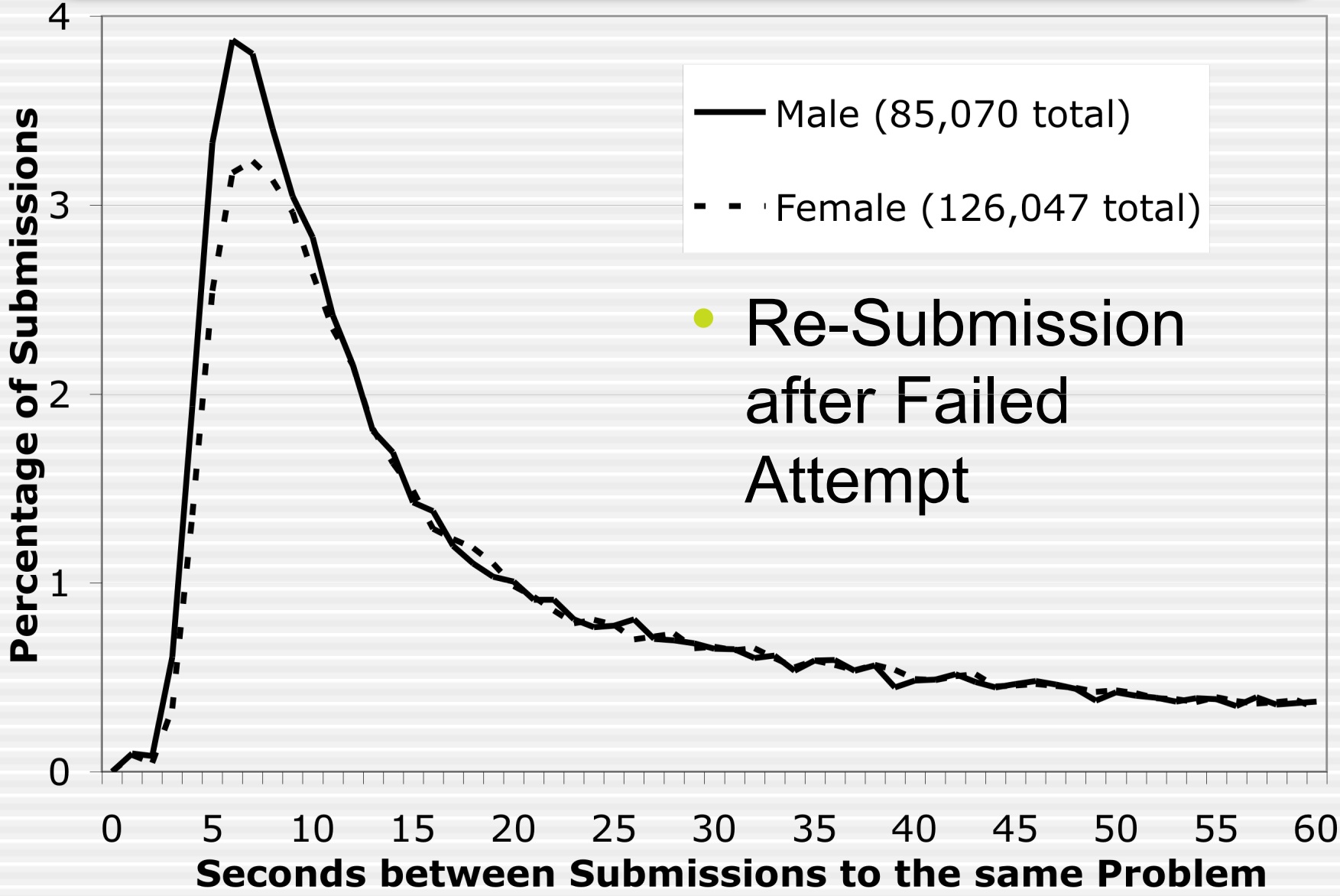
- LON-CAPA-related:
  - Three peer-reviewed publications
  - Three conference presentations
  - One book chapter
  - Two current grant projects
  - Two grant applications
  - Potential new project: recruitment and retention of high school physics teachers – anybody else interested?

Gender Differences

- Self-reported first action on problems



Gender Differences



- Re-Submission after Failed Attempt

Gender Differences

- Most significant difference: how to make use of the allowed multiple tries
- Most other differences statistically insignificant

Awards

- German VITA project became finalist in European eLearning Award eureleA 2009
- file:///Users/korte/Documents/LON-CAPA%20Presentations/vitamvideo.swf

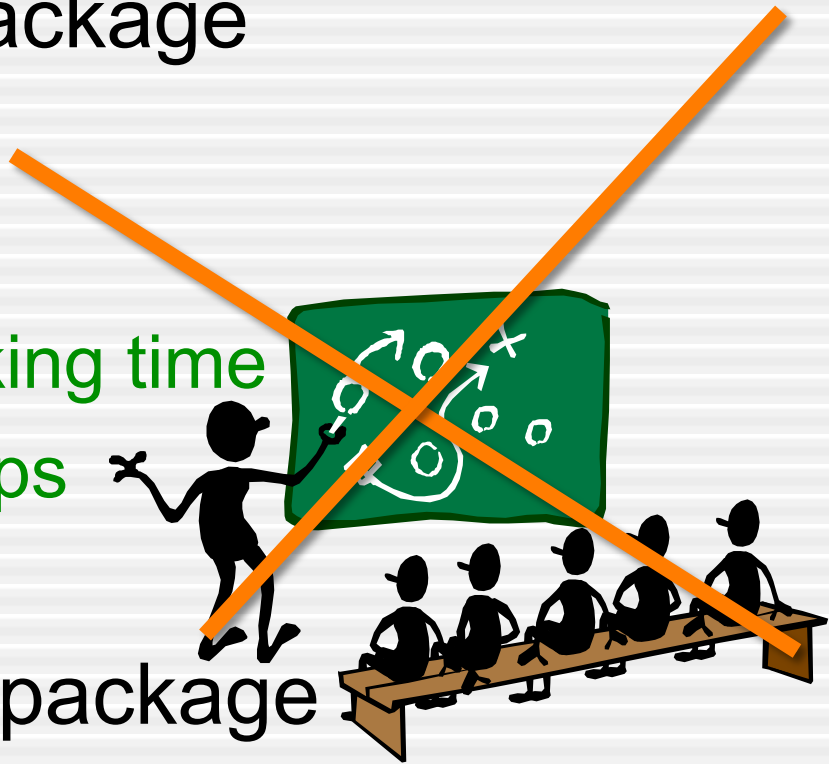
Huh?

- Strange, but expected development
- Blackboard bought Angel
- Already bought WebCT
- Sues Desire2Learn

Conference Logistics

Schedule

- Make sure to register at the desk in front of Sparty's and get your package
- Based on feedback:
  - **Less** plenary talks
  - **More** F2F social networking time
  - **More** hands-on workshops
  - **More** caffeine
- The schedule is in your package
- In parallel sessions, you can attend any one session, or even switch midway



Laptops and Connectivity

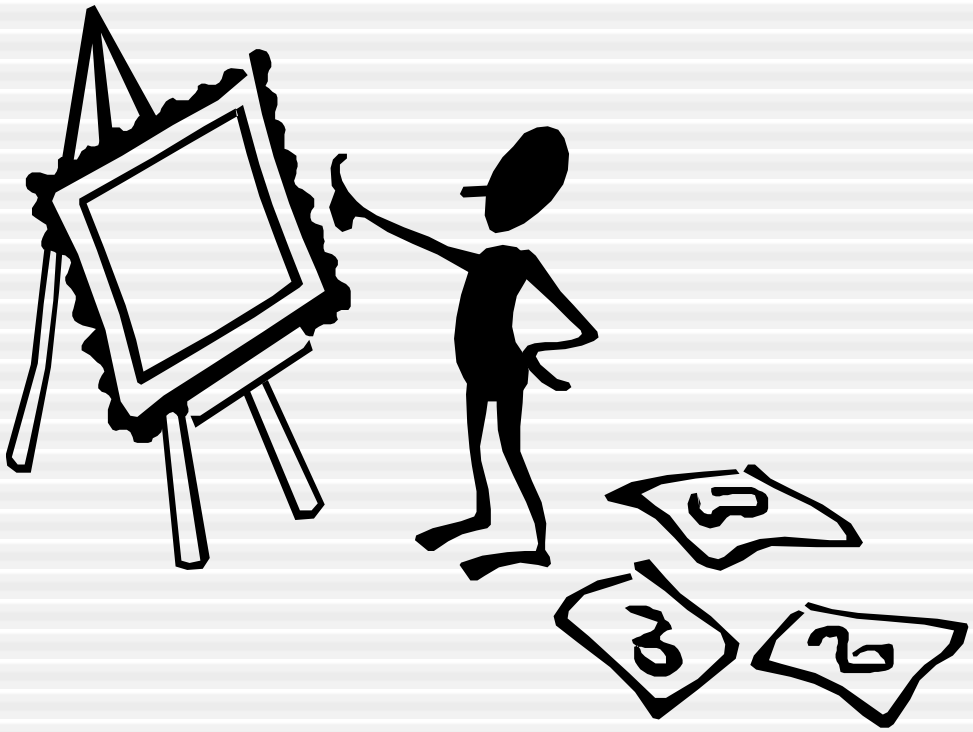
- In Sparty's, you can check out a laptop
- Connection information in your package
- Return the laptops into the cart for charging between sessions
- There is a limited number of outlets in the session rooms
- The dorm rooms only have wired internet, we have cords that you can use

Breaks and Meals

- Coffee breaks are in Sparty's
- Meals are in the upstairs cafeteria
- Eat all you can, we already paid for it

Posters

- You can set up your posters during lunch time
- See us in Sparty's



Welcome!

- Once again, welcome to Michigan State University!