The Virtual Classroom:
At the Cutting Edge of Higher Education

Prof. Burks Oakley II

Sloan Center for Asynchronous Learning Environments (SCALE)

Univ. of Illinois at Urbana-Champaign

September 28, 1995

Challenges to Learning

- Students in introductory courses need rapid feedback, while they are working on a particular subject.
- Students need to have access to TA's and faculty when they are studying – not the next day.
- Faculty and TA office hours do not match student study hours.

Challenges to Learning

- We recognize the importance of active learning, but many students do not participate in a large lecture class.
- Teamwork is important, but it is difficult to get team members together outside of class.
- Students need sense of community.

Challenges to Educators

- We need to do more to engage all students in active learning.
- Retention in many courses is too low, and needs to be increased.
- What can we do to decrease costs and to increase faculty productivity?

How to Address these Challenges?

- We believe that networked computers and appropriate software can provide the answer to this question.
- Our original efforts began in January 1994 with funding from the Alfred P. Sloan Foundation - to restructure ECE 270 (Intro. to Circuit Analysis).

Background – ECE 270

- “Introduction to Circuit Analysis”
- ECE 270 is taken by ~400 students per semester.
- It is required in many engineering disciplines: aeronautical, biomedical, electrical, computer, mechanical, industrial, and applied mechanics.

What Students Learn

- Students (mostly sophomores) learn to apply fundamental laws to analyze electric circuits.
- They write equations based on fundamental laws, and solve for circuit variables (current, voltage, power). Problems have quantitative (numerical) answers.

ECE 270 – CircuitTutor®

- Stand-alone tutorials provide rapid feedback and help at all hours.
- Network-based homework & quizzes automate the process of collecting and grading students' work.
- Homework and quiz answers are submitted over the Internet via FTP to a UNIX server for instant grading.

CircuitTutor®

CircuitTutor Homework

CircuitTutor® Homework

This **CircuitTutor®** module contains homework problems for a course in introductory circuit analysis, and these problems have been designed to be submitted over the Internet computer network for grading. In addition, this module can be used to obtain the results of each homework problem after it has been graded. The format of these problems is identical to that of problems found in the corresponding **CircuitTutor** modules, and you should make sure that you understand all of the problems in the appropriate **CircuitTutor** module before working the homework problems. Click on the right-facing arrow to continue.

Version 2.0

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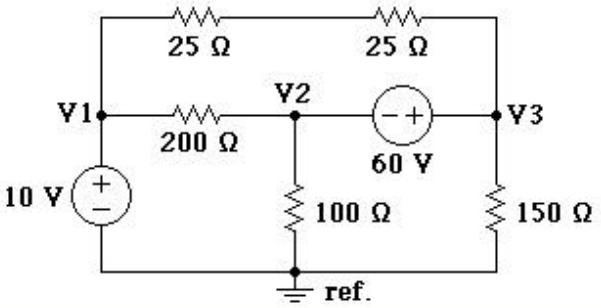
CircuitTutor®

CircuitTutor Homework

Problem 3.5: Use the node voltage method to calculate the three node voltages, **V1**, **V2**, and **V3**, in the circuit shown below. Enter your answers on the appropriate lines and then click on the "Done" button to submit your work for grading.

V1 = ... **volts**
V2 = ... **volts**
V3 = ... **volts**



CircuitTutor®

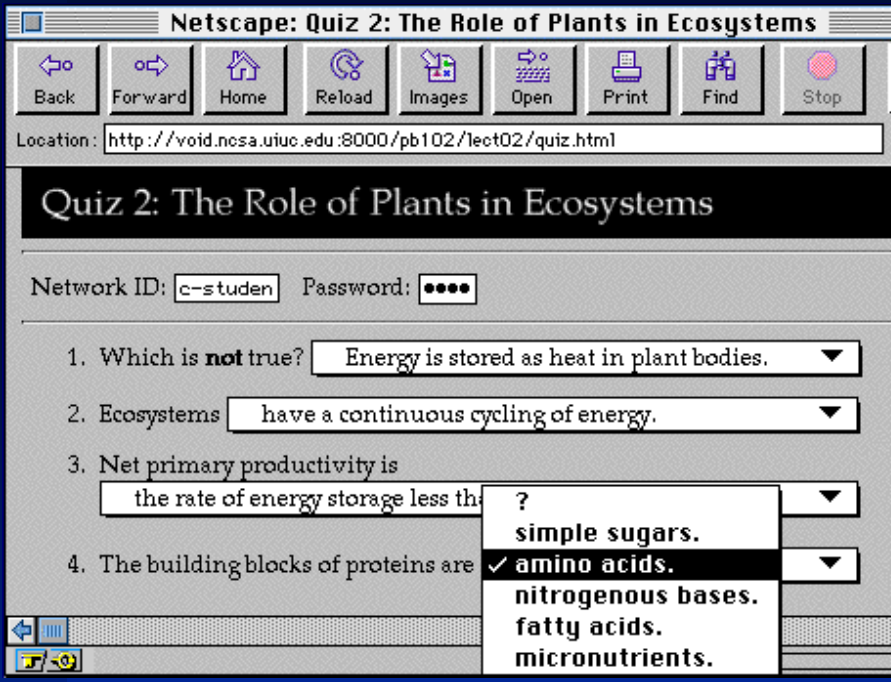
CircuitTutor Homework

Filename: PR3PT5.RES

cstudent ECE270A
HW Problem: PR3PT5
Time when graded: 6:52:27 AM, 4/19/95
Results of individual questions (1 = right; 0 = wrong):
1 1 1
3 out of 3 correct; 100 percent correct
Submitted on time; no late penalty.
Total score on this problem = 1.0

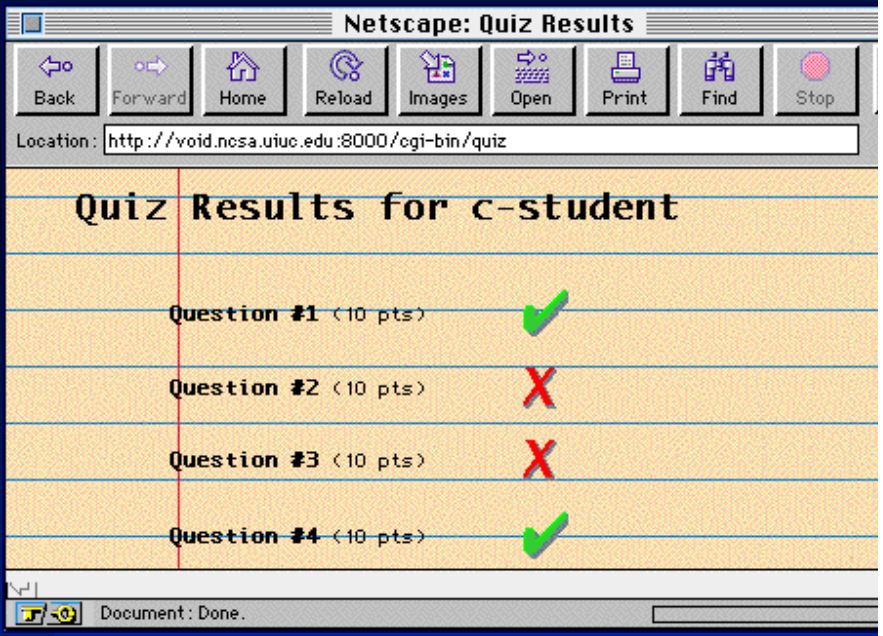
World-Wide Web

- Prof. R. Crang - Plant Biology 102



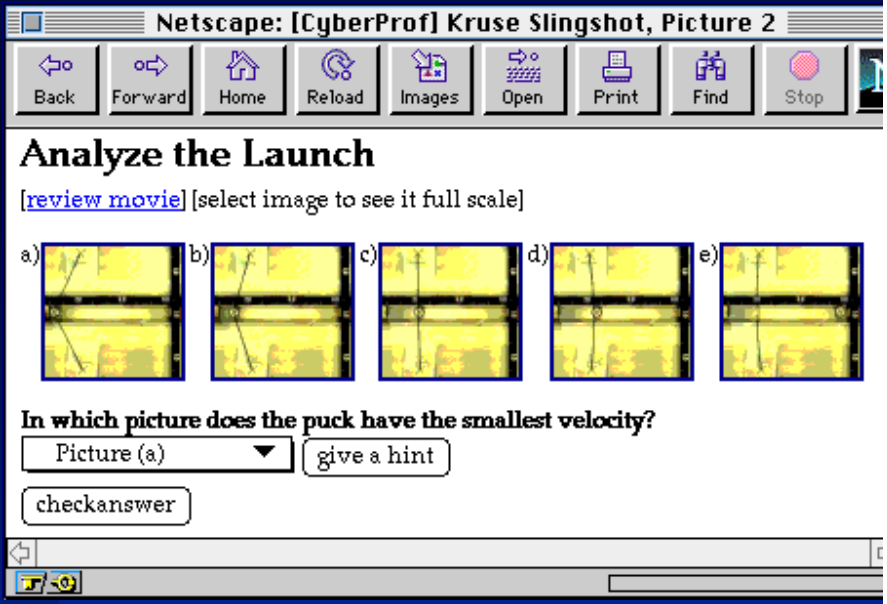
World-Wide Web

- Prof. R. Crang - Plant Biology 102



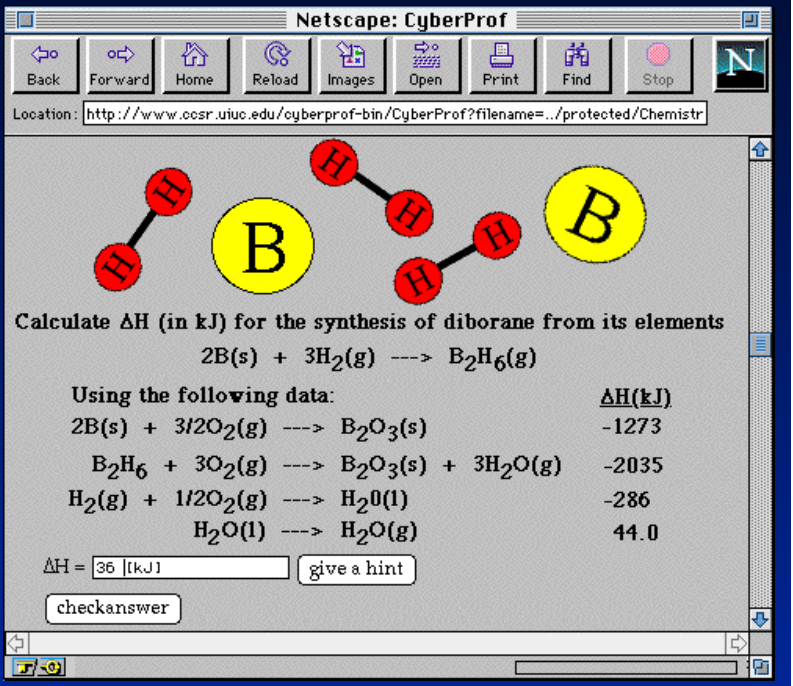
World-Wide Web

- Prof. A. Hübler - CyberProf™



World-Wide Web

- Prof. B. Whitmarsh - Chem 102b



Student Learning

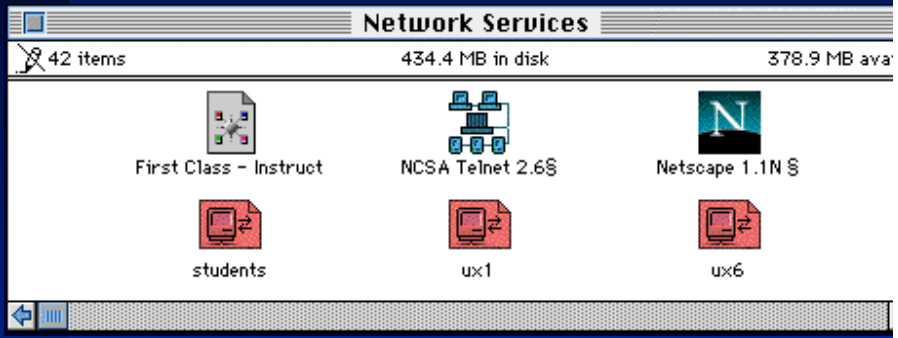
- What happens when a student does NOT understand a certain topic?
- The student can discuss the problem
  - with a peer
  - with a teaching assistant (TA)
  - with a professor.
- There is a need for individualized attention – involving contact with other PEOPLE.

FirstClass Software

- Permits asynchronous conferencing using networked computers.
- Commercial product ($5 per user).
- Client-server architecture.
- Macintosh & Windows clients.
- Uses TCP/IP protocol.
- >3500 student users on UIUC campus.

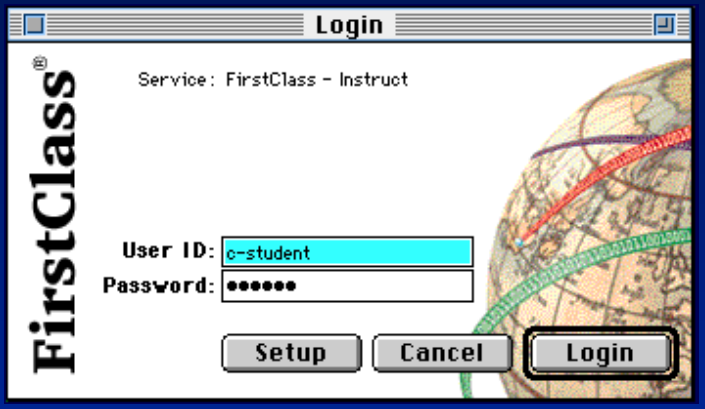
FirstClass – Access

- The client software is installed on all CCSO and housing computers, and students can install the client software on their own computers.



FirstClass – Logging In

- Each student has a unique User ID - it is the same as the “Net ID” used with the on-line registration system.

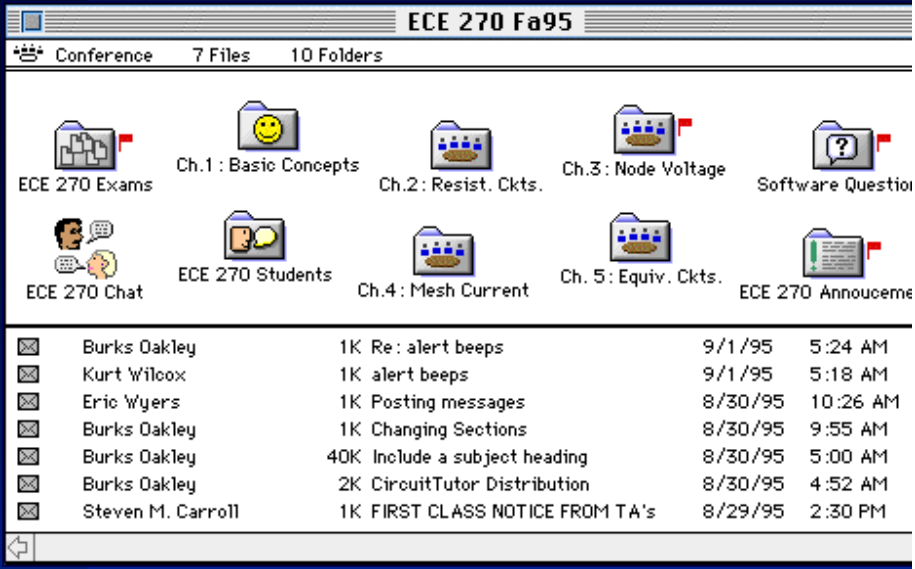


FirstClass - Interface

- Has a graphical user interface – icons represent “conferences”.

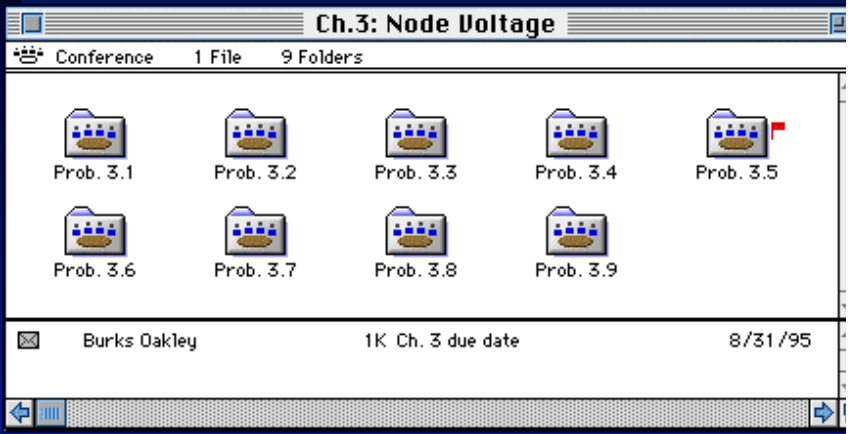
FirstClass - Conferences

- Easy to organize on-line discussions.



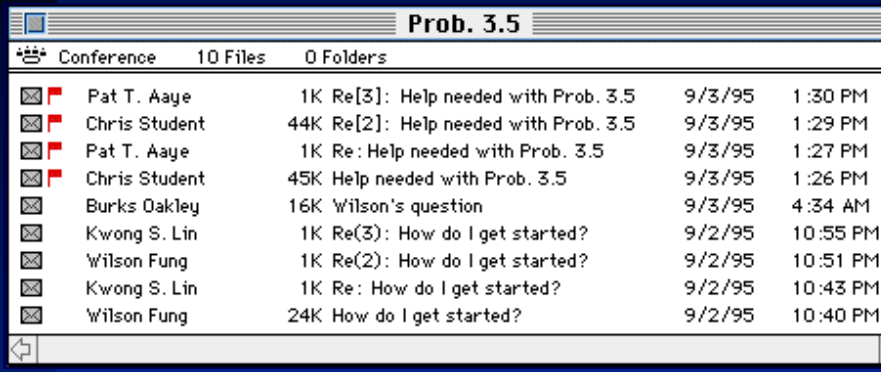
FirstClass

- Conferences can be “nested” to provide interaction on a very specific topic.



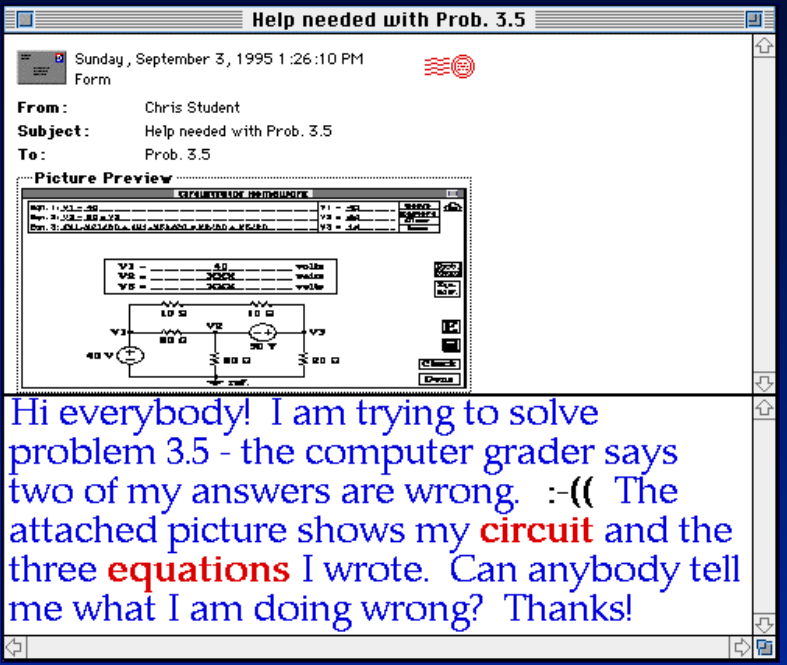
FirstClass – Threading

- Postings to a conference make up a “threaded” conversation.



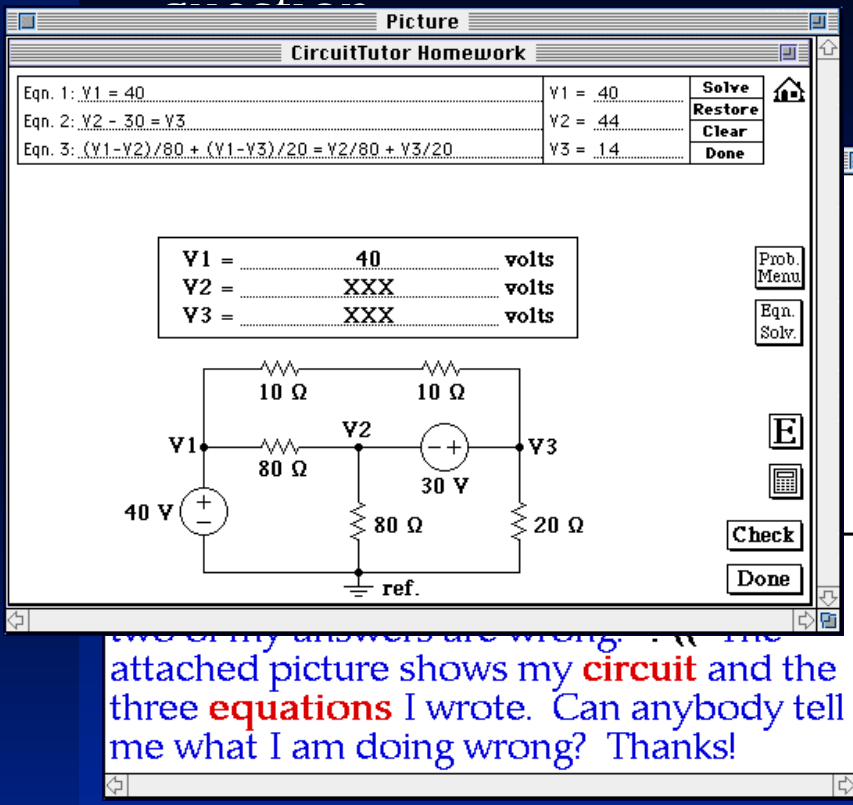
Virtual Assistance

- A student posts a question.



Virtual Assistance

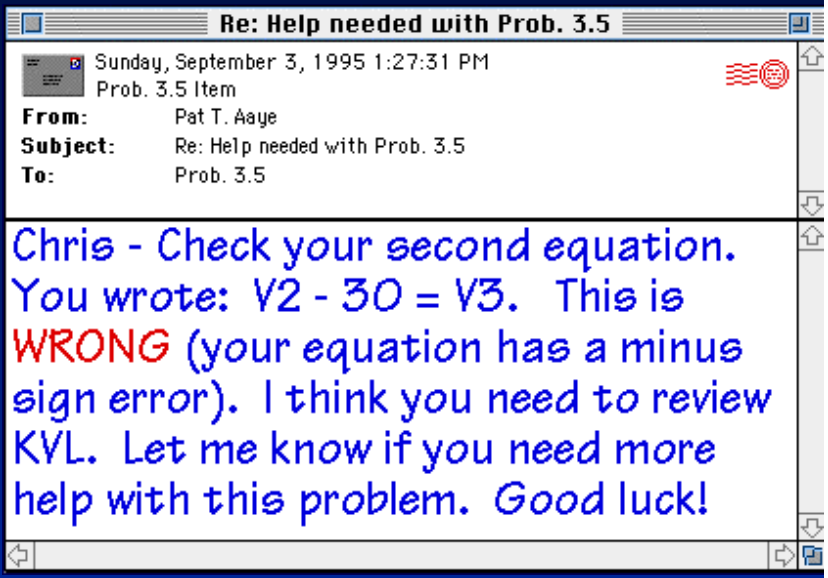
- A student posts a



attached picture shows my **circuit** and the three **equations** I wrote. Can anybody tell me what I am doing wrong? Thanks!

Virtual Assistance

- An on-line TA posts a response moments later.



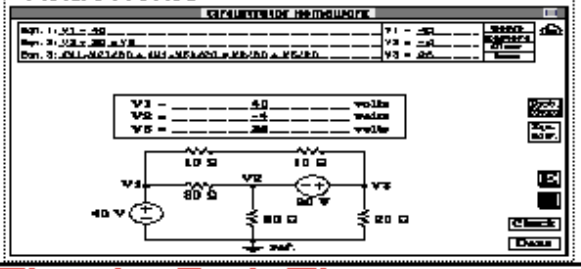
Virtual Assistance

Re[2]: Help neede with Prob. 3.5

Sunday, September 3, 1995 1:29:10 PM
Form

From: Chris Student
Subject: Re[2]: Help neede with Prob. 3.5
To: Prob. 3.5

Picture Preview



Thanks Pat! The correct equation was: V2 + 30 = V3. The computer grader says that my new answers are correct! Thanks for your help!!! :-))

Virtual Assistance

Picture

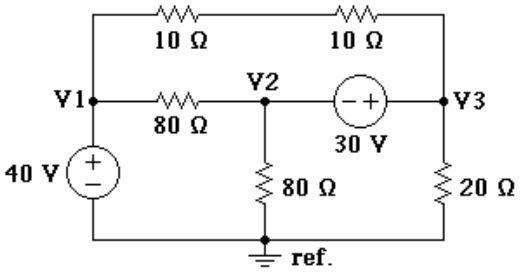
CircuitTutor Homework

Eqn. 1: V1 = 40	V1 = 40	Solve
Eqn. 2: V2 + 30 = V3	V2 = -4	Restore
Eqn. 3: (V1-V2)/80 + (V1-V3)/20 = V2/80 + V3/20	V3 = 26	Clear
		Done

V1 =	40	volts
V2 =	-4	volts
V3 =	26	volts

Prob. Menu

Eqn. Solv.



E

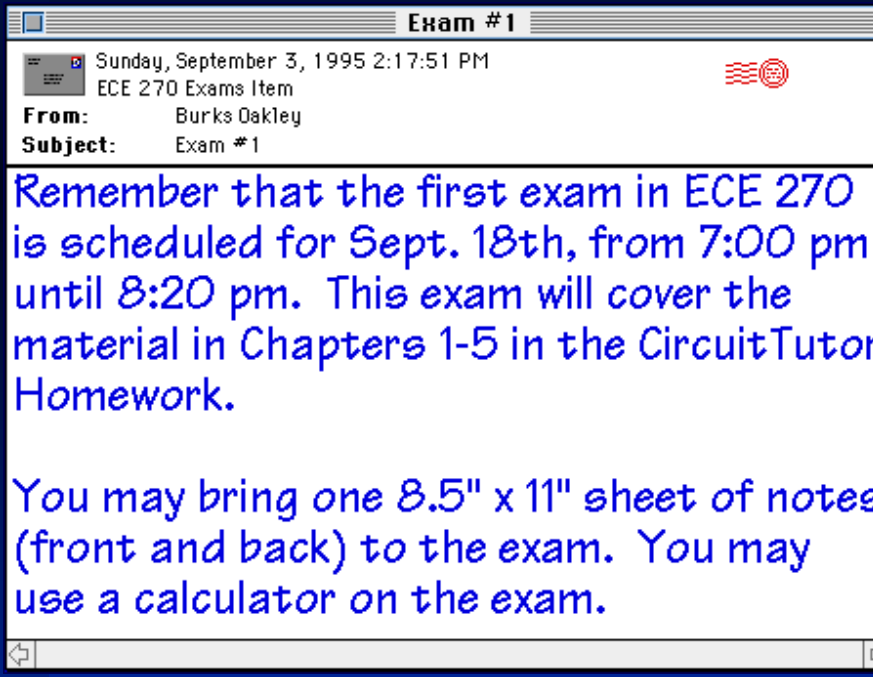
Check

Done

correct! Thanks for your help!!! :-))

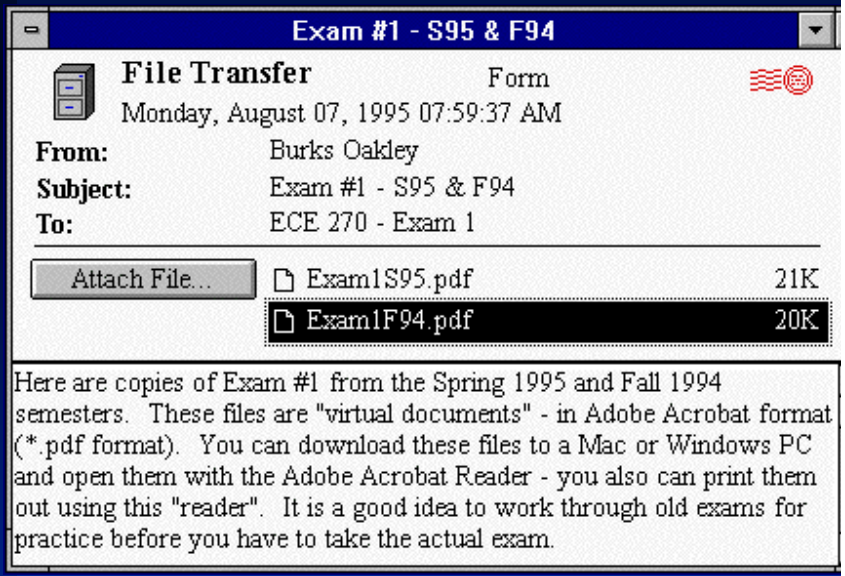
Course Information

- Easy way to distribute course material.



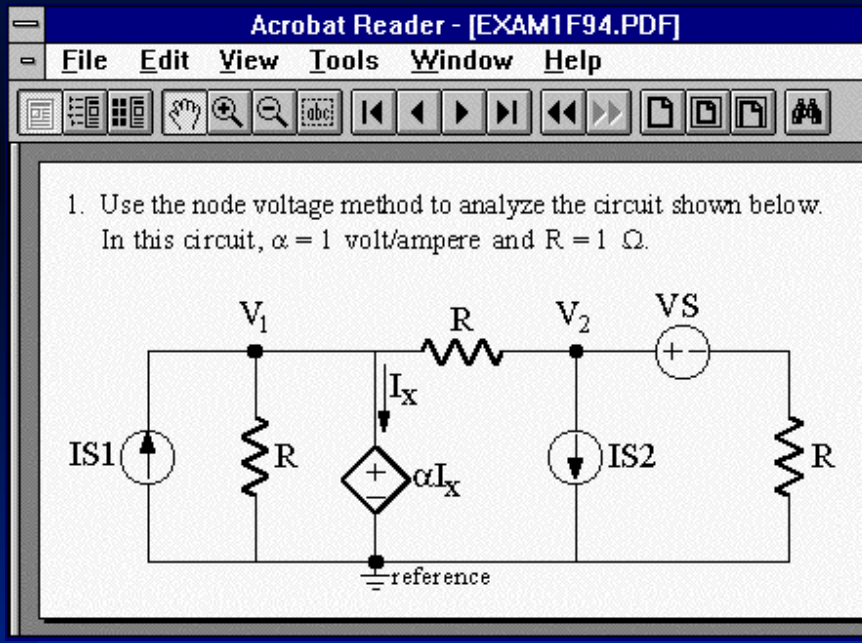
Virtual Documents

- Can be read cross-platform (on both Macintosh and Windows computers).



Virtual Documents

- Macintosh to Windows, & *vice versa.*



Asynchronous Conferencing at UIUC

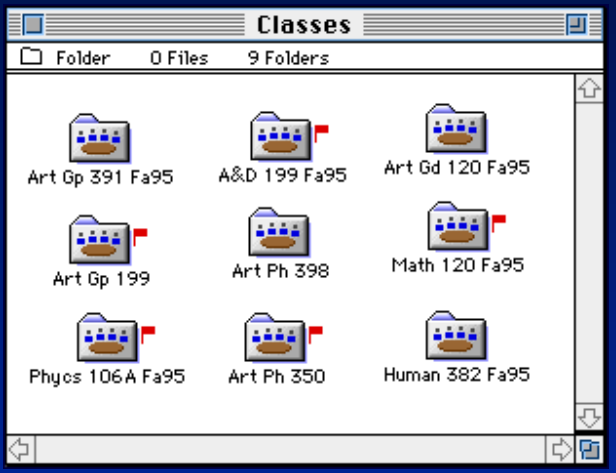
- Other UIUC faculty have started using FirstClass (or PacerForum) as a regular part of their classes.
- During the Fall 1995 semester, over 40 classes in 7 different colleges are using asynchronous conferencing.

Courses using FirstClass

- The “Classes” folder from “Instruct”.

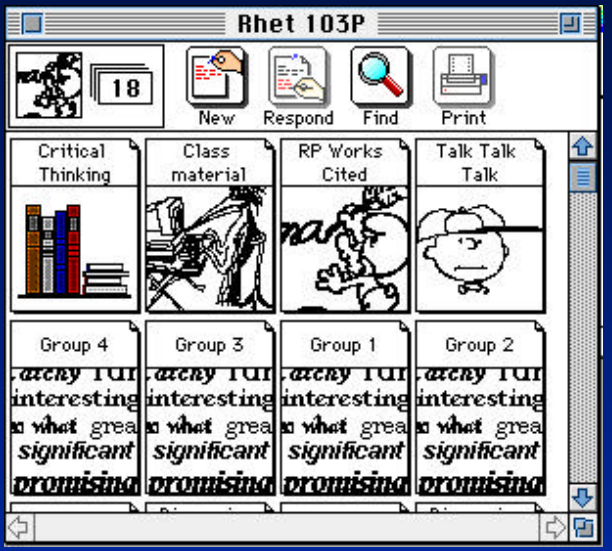
Courses using FirstClass

- The “Classes” folder from “Collaborate”.



PacerForum

- Rhetoric 103 - Sibylle Gruber.
- Short essays - building community.



PacerForu
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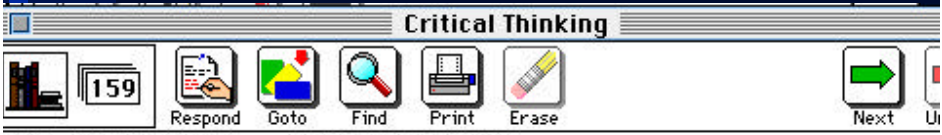


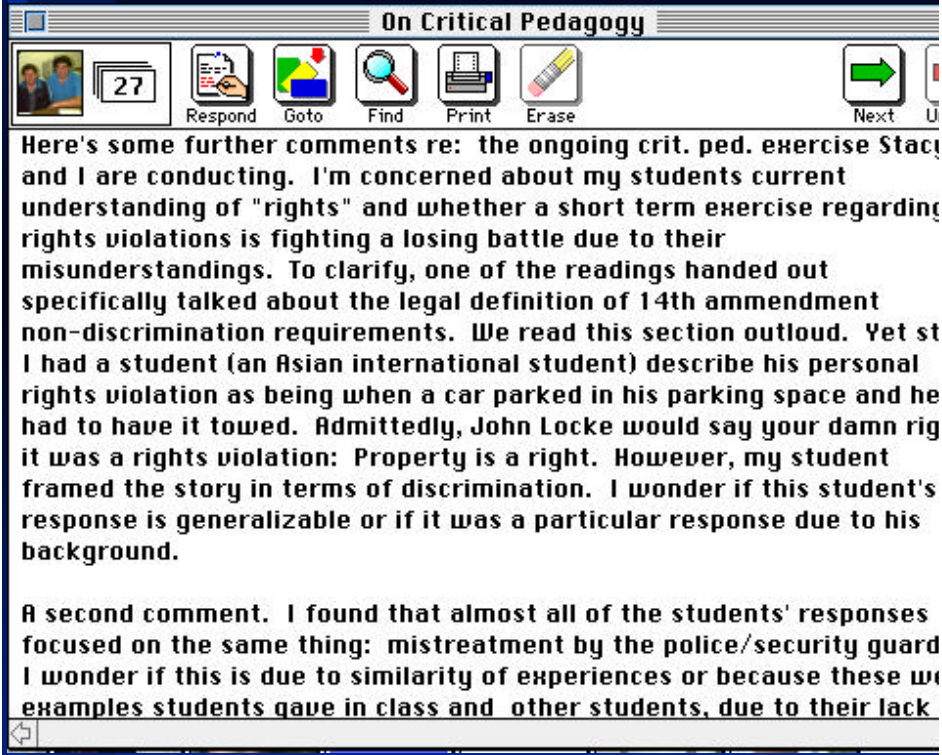
148. Leo Thompson 11/16/94 5:42 AM

Legalizing marijuana has been a hot debate for a while now. I truly believe that if cigarettes and alcohol have the standards to be legalized then so does marijuana. Don't get me wrong now I am in no way promot this cannabis ,but I feel that legalizing marijuana could open up a large profitable industry which inevitably will open up more job opportunities also strongly believe that if this cannabis was legalized then a number c people who smoke it will decrease their habits because of the lack of th they would recieve. By thrill I mean that when people do things that are illegal and get away with it they get some sort of thrill that promotes them to do it over and over again. One reason why I think marijuana has not been lagalized yet is because of the negatives that will be instilled upon those who promote the legalization of such a product. Politicians these days fear what would happen to their image if they promote such substance.

Virtual Discussions

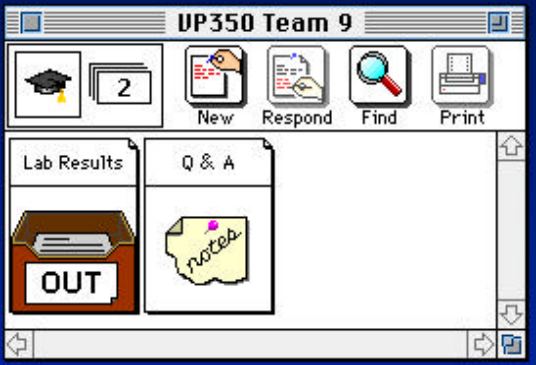
- English 493 - Prof. Gail Hawisher.

Critical Thought

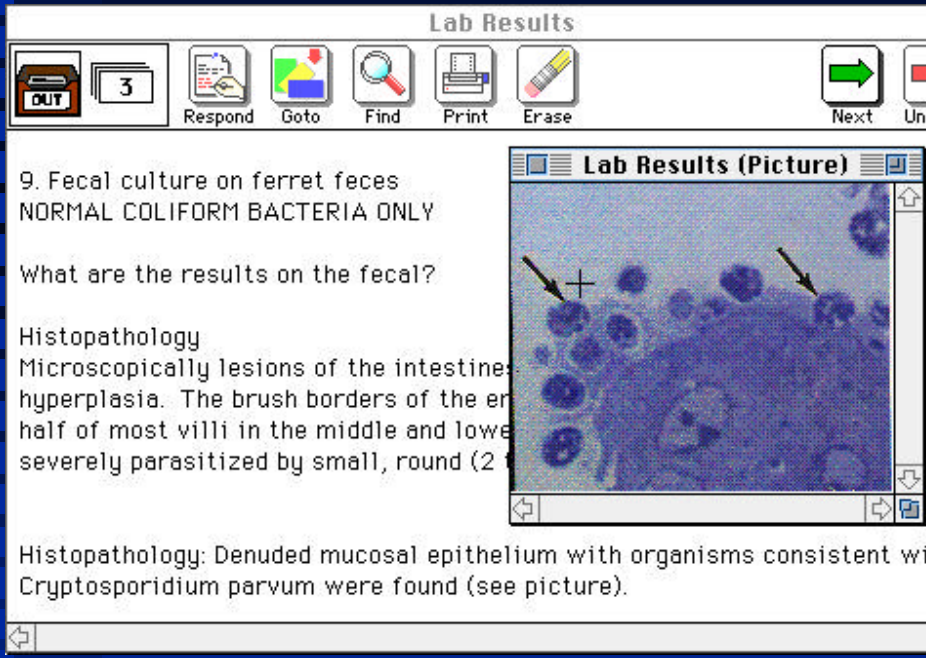


Simulations

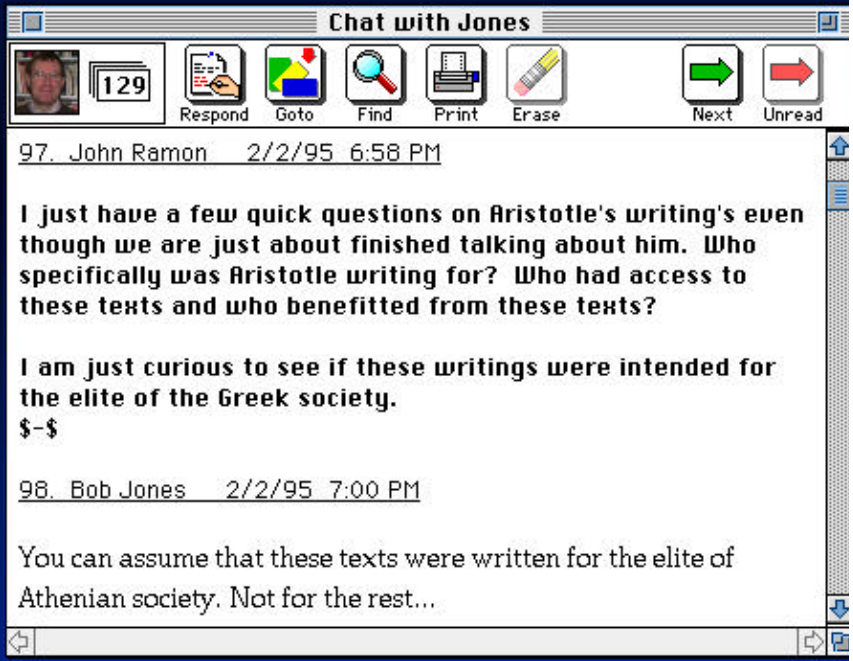
- Veterinary Pathology - Dr. R.D. Smith.
- Each team simulated (in real-time) a disease outbreak lasting 3 days.



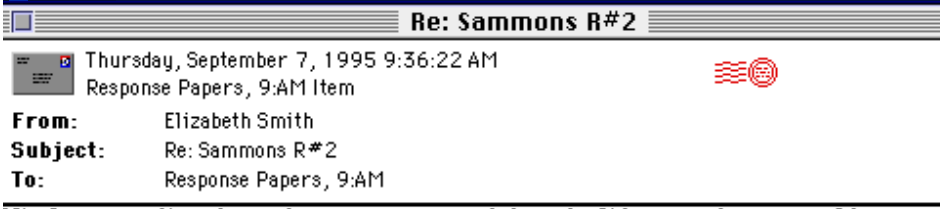
Real-Time Simulation



Increased Student-Faculty Interactions



Increased Student-Student Interactions



Re: Sammons R#2

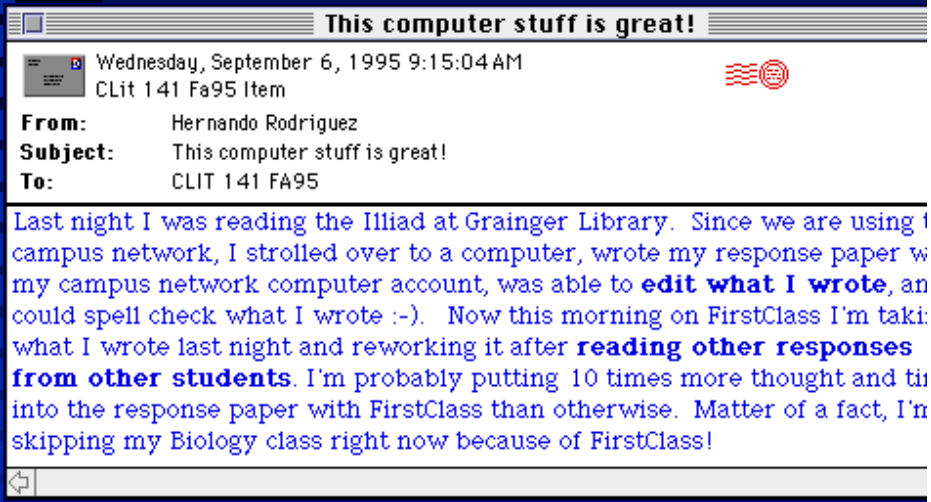
Thursday, September 7, 1995 9:36:22 AM
Response Papers, 9:AM Item

From: Elizabeth Smith
Subject: Re: Sammons R#2
To: Response Papers, 9:AM

Hi. I was reading through some papers and thought I'd respond to yours, I hope you
mind. I agree with your comments and they helped add a new perspective on to how
thinking about the heros. I have a few questions for you though. Yes, Hektor's mot
displaying her breast symbolized his vunerability as a human, but can it symbolize a
differences in Hektor's family and Akhilleus? Even using Hektor's relationship with
wife and child as a reflection of how he was raised, can you see a difference(or many
between Akhilleus and Hektor? Hektor was faithful, he viewed the war as his job and
destiny, but not really as his life, he was calm, decisive (relatively), and strong. Akh
was brought up in a half-god, half-mortal situation. You never hear about his father
apparently has a wife, but is after the conquest of Bresies, he is totally indecisive, he
mommy, he is a spoiled little brat. I view Hektor as the greater of two heros by my
non-Mediteranean perspective, and view Akhilleus as someone who needs a good sla
Anyway, just a few thoughts. Thanks for giving me a new perspective to work with,
forward to reading more of your papers. -Beth

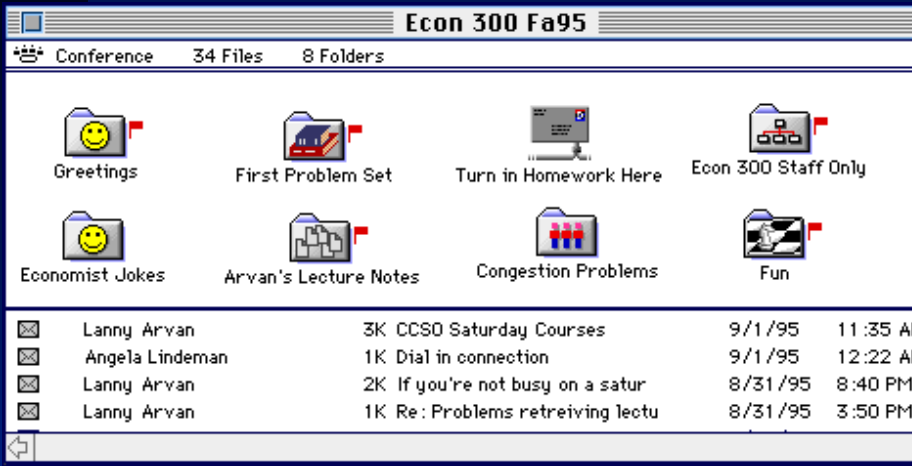
Learning Opportunities for Students

- Students are applying technology in many diverse fields.



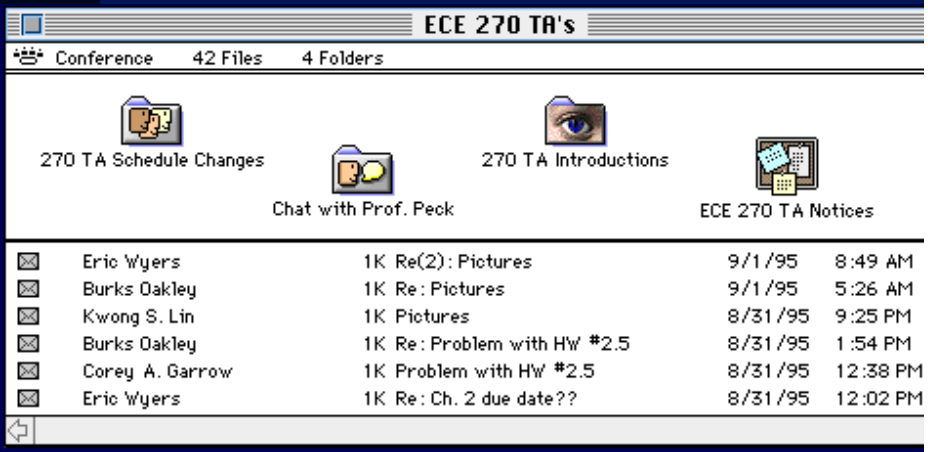
Empowers Faculty

- Faculty can add or delete specific discussion areas as needed.



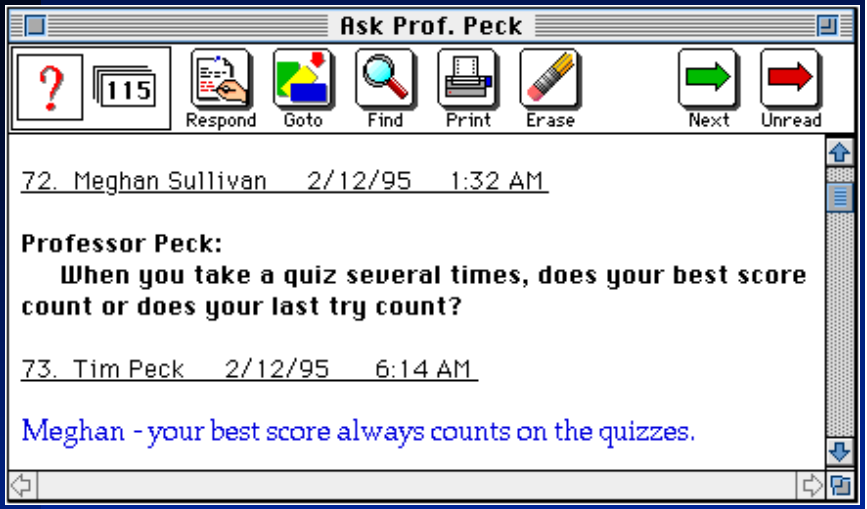
Efficient Use of Time

- Faculty no longer need to have weekly meetings with their TA's.



Efficient Use of Time

- Faculty can work from home at convenient hours.



Computer Conferencing

- Provides “virtual office hours” - at the times when students work.
- Provides cost-effective TA support to large lecture courses.
- Promotes teamwork.
- Builds sense of community.
- Increases student access to faculty and TA’s outside of the classroom.

Preliminary Outcomes

- Increased retention - fewer drops.
- Improved test performance.
- Very positive student evaluations.
- Less faculty time spent in meetings.
- More efficient use of faculty time - increased “transaction density”.
- No increase in cost - through more efficient use

Improved Retention

- Average of previous 7 semesters in ECE 270 – 12.8% drop rate (ranging from 9.4% to 19.0%).
- Spring 1995 semester – we observed a 6.6% drop rate.
- The networked homework and the on-line conferencing system combine to provide additional support to the “marginal” students.

Impact on Course Grades

- ECE 270 – Fall 1994 – 2 "traditional" sections, 3 "computer-based" sections:

Course Grade	Traditional	Computer-Based
A	17.4 %	38.1 %
B	31.8 %	26.0 %
C	35.6 %	21.5 %
D	6.8%	6.6%
E		

Faculty Productivity

- In the Spring 1995 semester, we increased the student/ faculty ratio in ECE 270 by 50%.
- We taught four sections, with a total of 420 students (vs. five sections, 350 students, in the Fall 1994 semester).
- No loss in quality of learning (55% of all students scored ≥90% on Exam #2).

Sloan Center at UIUC

- We have received additional support from the Sloan Foundation and the UIUC provost to implement the Sloan Center for Asynchronous Learning Environments (SCALE).
- We are integrating Asynchronous Learning Networks (ALN) into courses in many different curricula at UIUC.

Goals of SCALE

- Evaluate the impact of these new ALN courses on certain outcomes:
  - Retention, time-to-degree
  - Economic issues (e.g., faculty productivity)
  - Faculty "quality of life"
- Provide a test of the value of ALN courses ON a campus.
- Disseminate our approach to other universities (especially CIC schools).

SCALE - Revised Courses

- Ag 100, AgEcon 100, AgEcon 339, ArtGD 120, Art GP 199, ArtPH 350, ArtGP 391, ArtPH 398, BioE 199, Bio 100, Bio 101, Bio 122, Chem 102B, Clas 112, Clas 116, CLit 141, Econ 102, Econ 300, ECE 110, ECE 270, ECE 290, ECE 375, Engl 103, Engl 296, Engl 302, Engl 493, FS 199, FN 240, Human 382, Kines 300, Math 285, M& IE 383, Phys 101, Phys 106, Phys 319, PlBio 102, Rhet 105, Rhet 133, Soc 122, Soc 222, UP 212, WS 332.

SCALE - Revised Courses

- First Year & Discovery Program
  - ECE 110, BioEng 199, Ag 100, FS 199
- General Education
  - Soc 122, Econ 102, AgEcon 100, CLit 141
- Early Work in Major
  - Biol 104 &122, Econ 300, Chem 102, UP 212, PlantBio 100 & 102
- Capstone Courses in Major
  - M&IE 393, ECE 375, Kines 300, AgEcon 339

SCALE - Other Projects

- Writing Across the Curriculum
  - On-Line Writers' Workshop
- Advising
  - Advising WorkBench (AWB)
- Pilot Projects - Development
  - Calculus & Mathematica
  - Women's Studies
  - Classics
  - Other courses will be added

SCALE - Training

- We have a major effort targeted at training:
  - faculty
  - teaching assistants
  - students
- Central to this effort are workshops, seminars, and the creation of detailed tutorials that are available on the World-Wide Web.

SCALE - Evaluation

- We also have a major effort targeted at evaluation of SCALE courses.
- The evaluation is being conducted by personnel from the UIUC Office of Instructional Resources.
- They are using direct observation, surveys, interviews, and comparative data in the evaluation process.

Implications for the Future

- Students and faculty will need increased access to networked computers both on- and off-campus.
- Faculty will need incentives to adopt new educational technologies and to develop new networked courses.
- There will be an on-going need for quality training and support.

The Virtual Classroom

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http://w3.scale.uiuc.edu/b-oakley/
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