

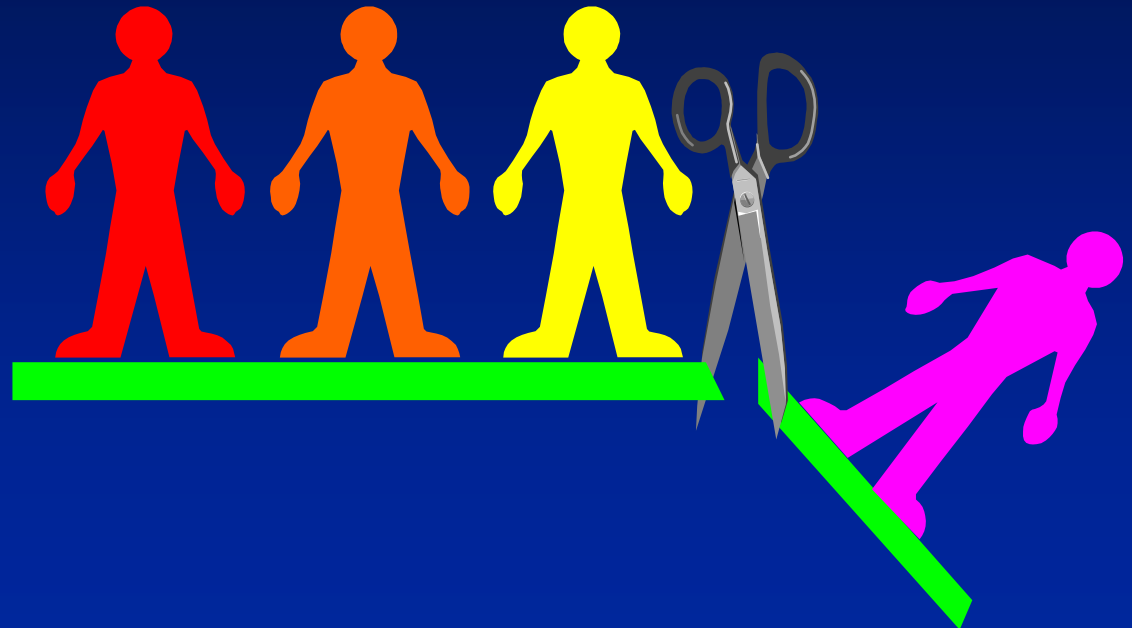
IMPROVING LEARNING AND REDUCING COSTS

New Models for Online Learning



HIGHER EDUCATION'S CHALLENGES

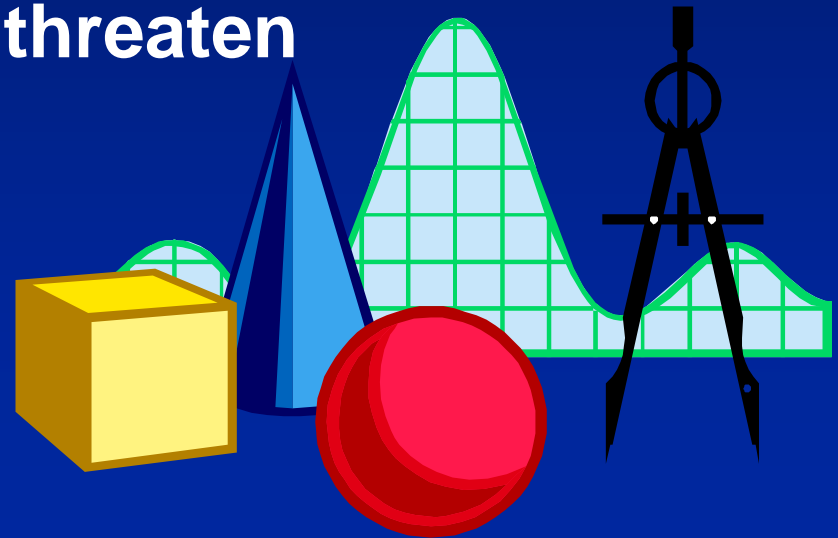
- Access
- Quality
- Cost

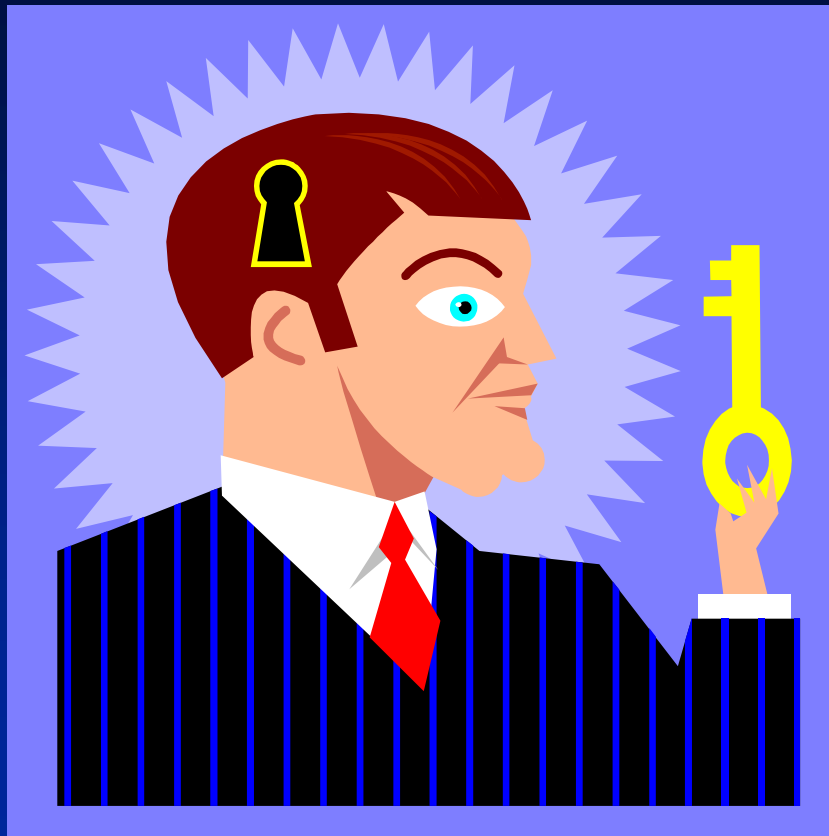


How can information technology help?

ASSUMPTIONS THAT GET IN THE WAY

- Improving quality means increasing cost
- Adding IT increases cost
- Using IT may even threaten quality





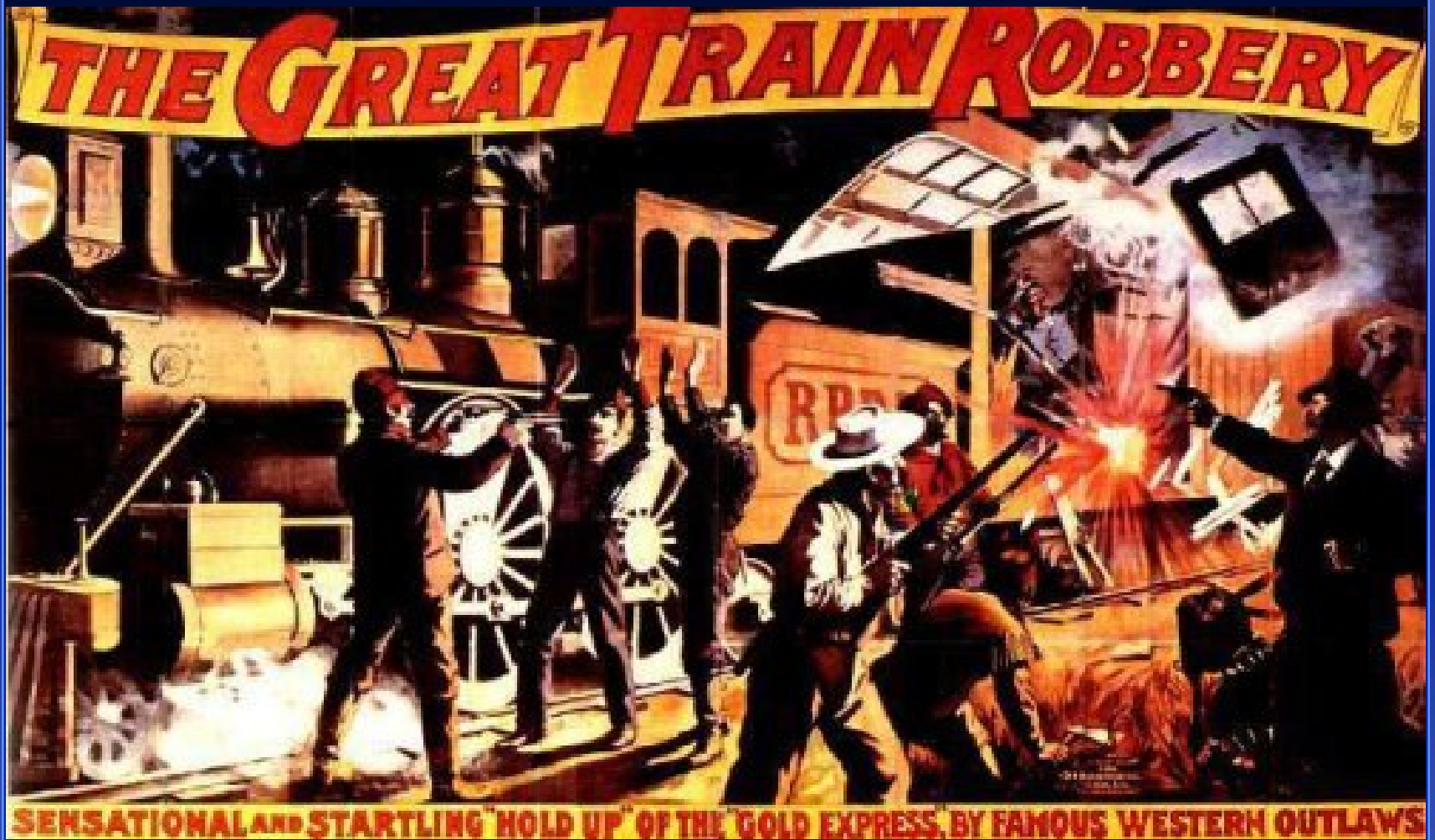
**“The
biggest
obstacle to
innovation
is thinking
it can be
done the
old way.”**



**Faced with the
invention of the
telegraph . . .**

**Buy faster horses!
Get better riders!**





... the first motion picture that stopped filming stage plays



Technique Lags Behind Technology

TRADITIONAL INSTRUCTION

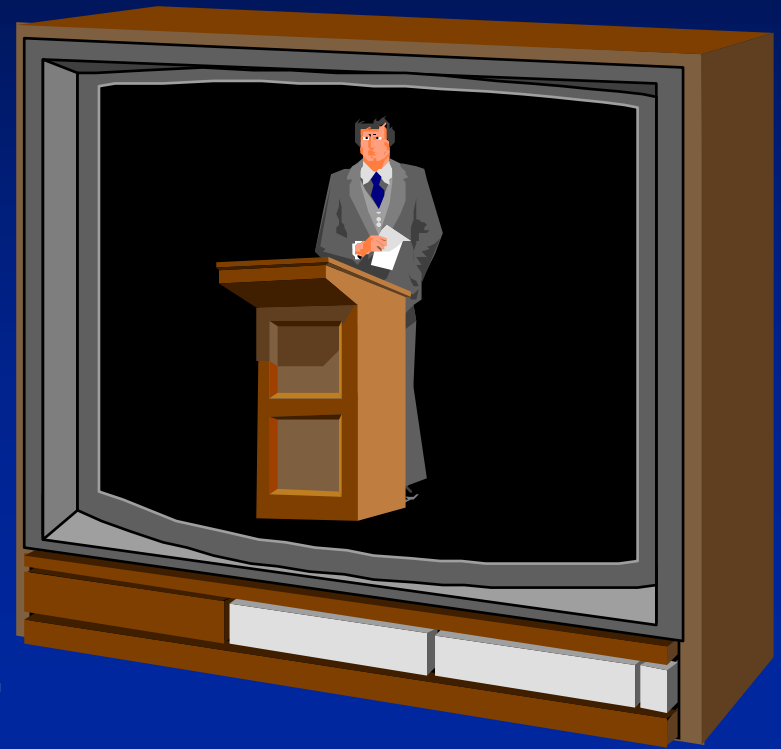


Seminars



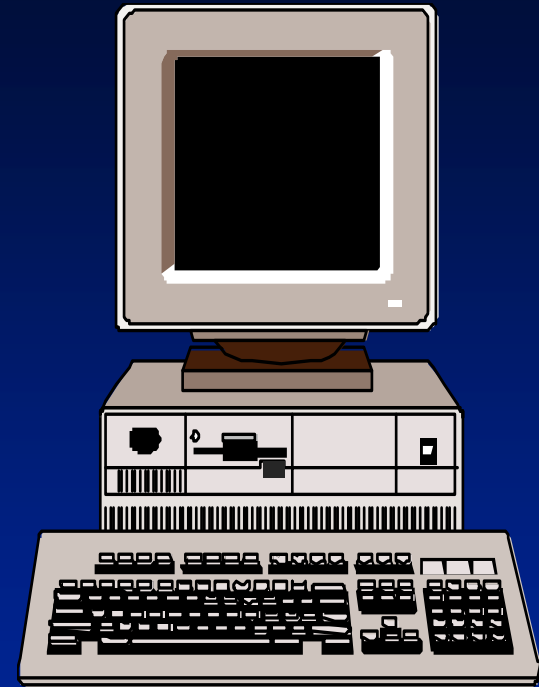
Lectures

“BOLT-ON” INSTRUCTION



PROGRAM IN COURSE REDESIGN

**To encourage colleges
and universities to
redesign their
approaches to
instruction using
technology to achieve
cost savings as well as
quality enhancements.**



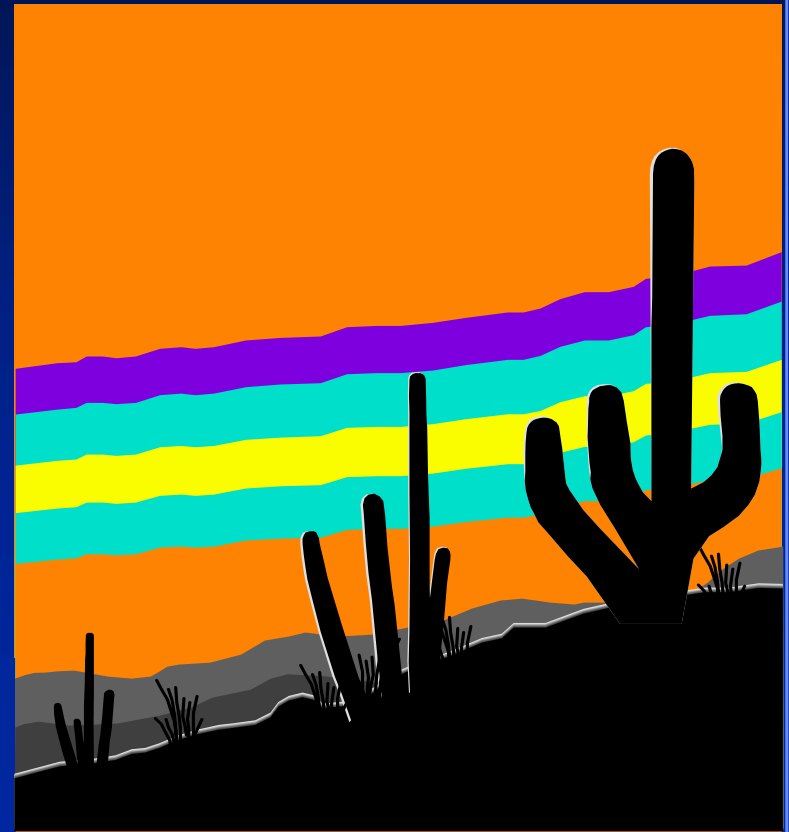
**\$6 million
30 projects**

THE ONE PERCENT SOLUTION

- Maricopa Community College District
- 200,000 students
- 2,000 course titles
- 25 courses =
44% enrollment

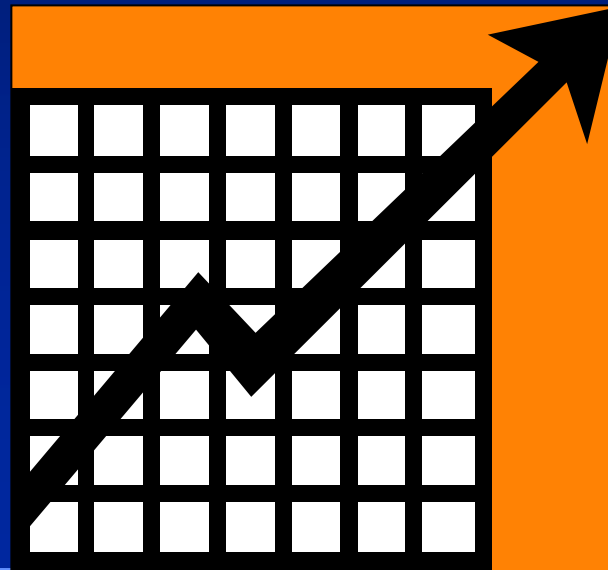
All CCs = 51%

All four-year = 35%



THE ONE PERCENT SOLUTION

- English (7)
- Psychology (1)
- Mathematics (5)
- Fitness (1)
- Sociology (1)
- Computing (1)
- Philosophy (1)
- Economics (2)
- Biology (2)
- Accounting (1)
- EMT (1)
- Spanish (1)
- Chemistry (1)



ROUND I INSTITUTIONS

20,585 Students Annually

- **IUPUI (Sociology)**
- **Penn State (Statistics)**
- **Rio Salado College (College Algebra)**
- **SUNY at Buffalo (Computer Literacy)**
- **U of Central Florida (American Government)**
- **U of Colorado-Boulder (Astronomy)**
- **U of Illinois-Urbana Champaign (Statistics)**
- **U of Southern Maine (Psychology)**
- **U of Wisconsin-Madison (Chemistry)**
- **Virginia Tech (Linear Algebra)**

ROUND II INSTITUTIONS

14,119 Students Annually

- **Cal Poly Pomona (Psychology)**
- **Carnegie Mellon University (Statistics)**
- **Fairfield University (Biology)**
- **Riverside Community College (Math)**
- **The University of Alabama (Math)**
- **University of Dayton (Psychology)**
- **University of Idaho (Math)**
- **The University of Iowa (Chemistry)**
- **University of Massachusetts (Biology)**
- **University of Tennessee (Spanish)**

ROUND III INSTITUTIONS

18,734 Students Annually

- **Brigham Young U (English Composition)**
- **Drexel U (Computer Programming)**
- **Florida Gulf Coast U (Fine Arts)**
- **Iowa State U (Discrete Math)**
- **Northern Arizona U (College Algebra)**
- **Ohio State U (Statistics)**
- **Portland State U (Introductory Spanish)**
- **Tallahassee CC (English Comp)**
- **U of New Mexico (Intro Psychology)**
- **U of Southern Mississippi (World Lit)**

QUANTITATIVE (13)

- **Mathematics**

- Iowa State University
- Northern Arizona University
- Rio Salado College
- Riverside CC
- University of Alabama
- University of Idaho
- Virginia Tech

- **Statistics**

- Carnegie Mellon University
- Ohio State University
- Penn State
- U of Illinois-Urbana Champaign

- **Computer Programming**

- Drexel University
- University at Buffalo

SCIENCE (5)

SOCIAL SCIENCE (6)

- **Biology**

- Fairfield University
- University of Massachusetts

- **Chemistry**

- University of Iowa
- U of Wisconsin-Madison

- **Astronomy**

- U of Colorado-Boulder

- **Psychology**

- Cal Poly Pomona
- University of Dayton
- University of New Mexico
- U of Southern Maine

- **Sociology**

- IUPUI

- **American Government**

- U of Central Florida

HUMANITIES (6)

- **English Composition**
 - Brigham Young University
 - Tallahassee CC
- **Spanish**
 - Portland State University
 - University of Tennessee
- **Fine Arts**
 - Florida Gulf Coast University
- **World Literature**
 - University of Southern Mississippi



REDESIGN CHARACTERISTICS

- Redesign the whole course, not just a single class
- Emphasize active learning; greater student engagement with the material and with one another
- Rely heavily on interactive software used independently and in teams
- Provide 24 x 7 access to online learning resources
- Provide on-demand, individualized assistance



Improving the Quality of Student Learning

REDESIGN CHARACTERISTICS

- Emphasize practice, feedback, reinforcement
- Respond to differences in learning style
- Use course management software to monitor student performance
- Automate grading of homework, quizzes, exams
- Replace single mode instruction with differentiated personnel strategies



Technology enables good pedagogy with large #s of students.

IMPROVED LEARNING OUTCOMES

- Penn State - 68% on a content-knowledge test vs. 60%
- UB - 56% earned A- or higher vs. 37%
- CMU - scores on skill/concept tests increased by 22.8%
- Fairfield – 88% on concept retention vs. 79%
- U of Idaho – 30% earned A's vs. 20%
- UMass – 73% on tougher exams vs. 61%
- FGCU - 85% on exams vs. 72%; 75% A's and B's vs. 31%
- USM - scored a full point higher on writing assessments
- IUPUI, RCC, UCF, U of S Maine, Drexel and U of Ala - significant improvements in understanding content

**25 of 30 have shown improvement;
5 have shown equal learning.**

REDUCTION IN DFW RATES

- U of Alabama – 60% to 40%
- Drexel – 51% to 38%
- Tallahassee CC – 46% to 25%
- Rio CC – 41% to 32%
- IUPUI – 39% to 25%
- UNM – 39% to 23%
- U of S Maine – 28% to 19%
- U of Iowa – 25% to 13%
- Penn State – 12% to 9.8%



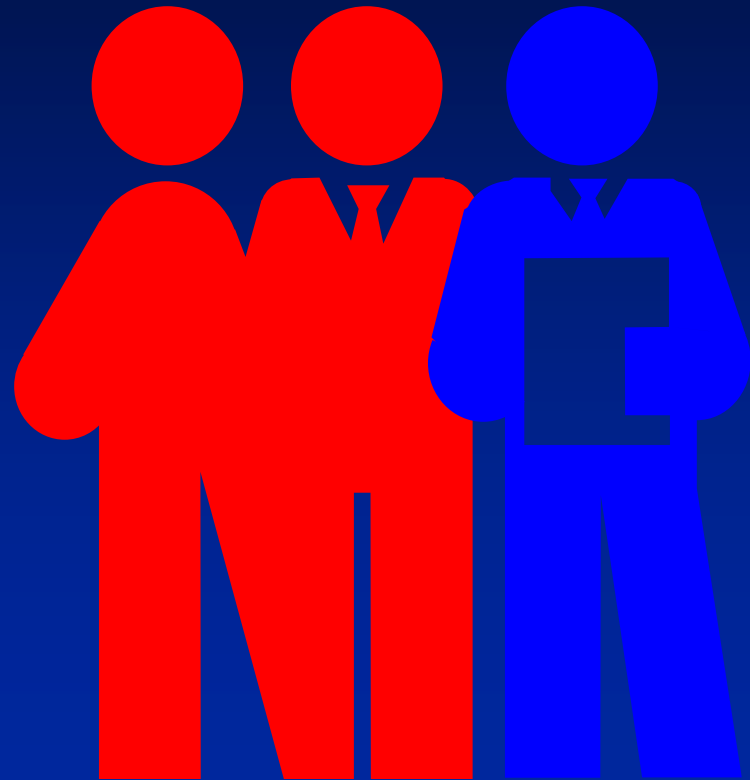
VARIETY OF WAYS TO REDUCE COSTS (Variety of Instructional Models)

- Maintain constant enrollment while reducing resources
- Increase enrollments while maintaining resources
- Reduce course repetitions
- Do two or more simultaneously



COST SAVINGS RESULTS

- Redesigned courses reduce costs by 40% on average, with a range of 20% to 77%.
- Collectively, the 30 courses projected a savings of about \$3.6 million annually.
- Final results show actual annual savings of \$3.1 million.



WHAT HAPPENS TO THE SAVINGS?

\$3.1 Million Annually

- Stay in department for continuous course improvement and/or redesign of others
- Provide a greater range of offerings at upper division or graduate level
- Accommodate greater numbers of students with same resources
- Stay in department to reduce teaching load and provide more time for research
- Redesign similar courses
- Miscellaneous
 - Offer distance sections
 - Reduce rental expenditures
 - Improve training of part-time faculty



GENERAL BIOLOGY at Fairfield University



- Inconsistent student academic preparation
- Inadequate student interaction with learning materials and complex topics
- Inadequate use of modern technology
- Inability of students to retain what they have learned (amnesia)
- Inability of students to apply biological principles to other disciplines (inertia)

➤ **Memorization vs. Application of Scientific Concepts**

ACADEMIC GOALS



- Enhance quality by individualizing instruction
- Focus on higher-level cognitive skills
- Create both team-based and independent investigations
- Use interactive learning environments in lectures and labs
 - to illustrate difficult concepts
 - to allow students to practice certain skills or test certain hypotheses
 - to work with other students to enhance the learning and discussion of complex topics

Traditional

- 7 sections (~35)
- 7 faculty
- 100% wet labs
- \$131,610
- \$506 cost-per-student

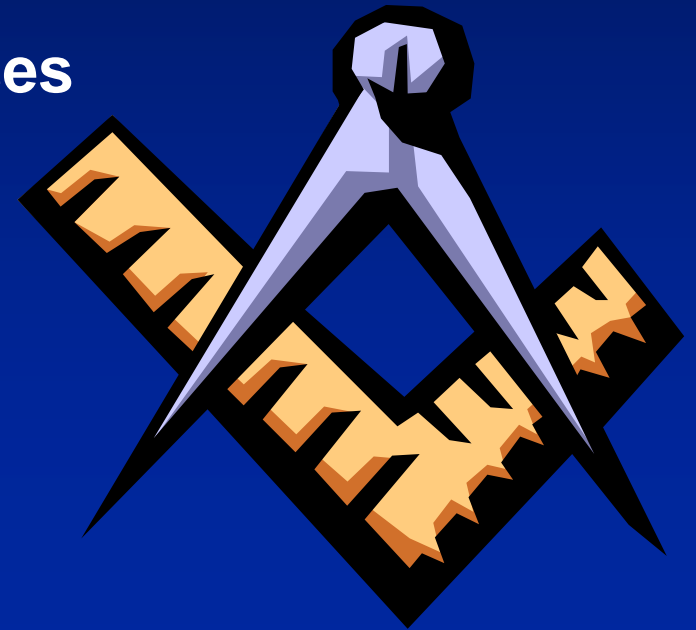
Redesign

- 2 sections (~140)
- 4 faculty
- 50% wet, 50% virtual
- \$98,033
- \$350 cost-per-student

- ✓ **Content mastery: significantly better performance**
- ✓ **Content retention: significantly better (88% vs. 79%)**
- ✓ **Course drops declined from 8% to 3%**
- ✓ **Next course enrollment increased from 75% to 85%**
- ✓ **Declared majors increased by 4%**

FIVE REDESIGN MODELS

- **Supplemental** – Add to the current structure and/or change the content
- **Replacement** – Blend face-to-face with online activities
- **Emporium** – Move all classes to a lab setting
- **Fully online** – Conduct all (most) learning activities online
- **Buffet** – Mix and match according to student preferences



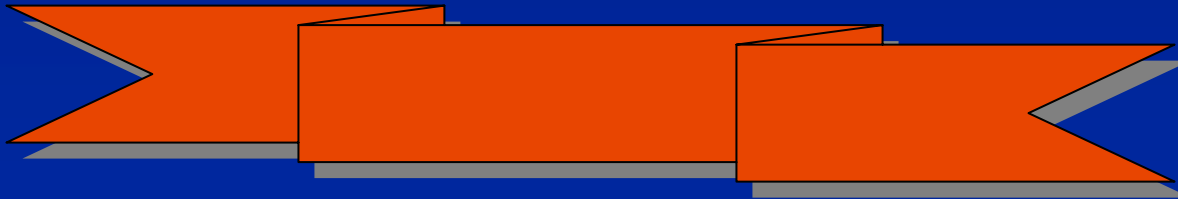
FULLY ONLINE MODEL

Traditional

- Redesign one class
- Emphasize instructor-to-student interaction
- Instructor does all grading and provides all student feedback
- Use a single personnel strategy

Redesign

- Redesign whole course
- Emphasize student-to-student interaction and teaming
- Automate grading and student feedback
- Use a differentiated personnel strategy



RIO SALADO COLLEGE

Pre-Calculus Mathematics



Traditional

- 4 courses taught by 4 instructors
- Student interaction = each instructor
- \$49 cost-per-student
- Retention = 59%

Redesign

- 4 courses taught by 1 instructor
- Student interaction = interactive software, 1 course assistant, and 1 instructor
- \$31 cost-per-student
- Retention = 65%

U. OF S. MISSISSIPPI

World Literature



Traditional

- 16 – 20 sections (~65)
- Taught by 8 faculty and 8 adjuncts
- Faculty do all grading
- \$70 cost-per-student

Redesign

- Single online section
- Team-taught by 4 faculty and 4 TAs
- 50% automated grading via WebCT; 50% TAs
- \$31 cost-per-student

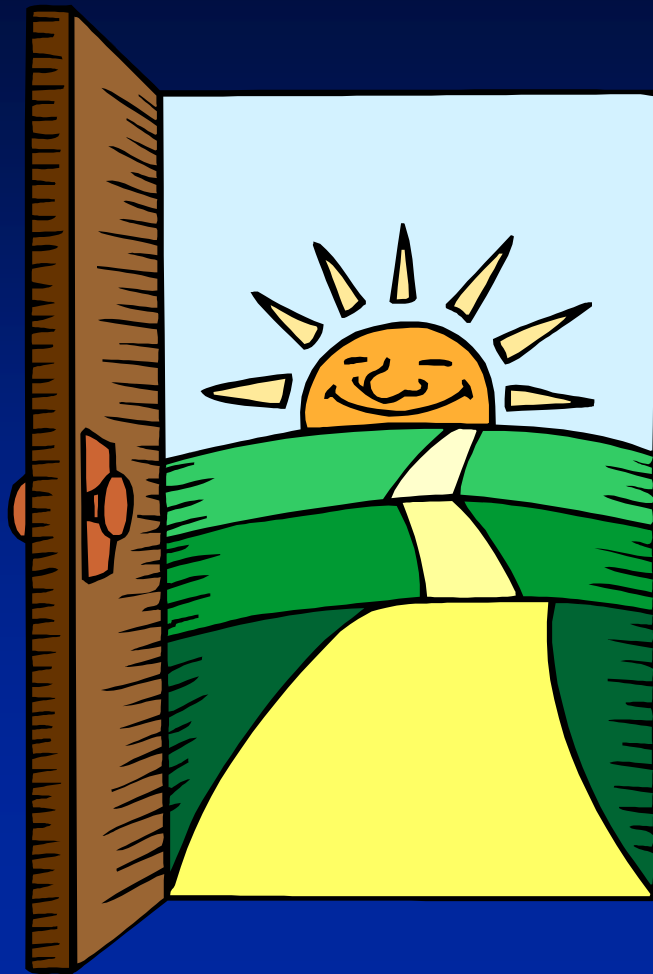
✓ Redesign triples course capacity.

WHAT DO THE FACULTY SAY?

- “It’s the best experience I’ve ever had in a classroom.”
- “The quality of my worklife has changed immeasurably for the better.”
- “It’s a lot of work during the transition-- but it’s worth it.”



THE ROADMAP TO REDESIGN



“R2R will establish a more efficient means of spreading the ideas and practices that have come out of the Program in Course Redesign. Our goal is to accelerate institutional adoption by simplifying the redesign process—making it as close to turnkey as possible—while allowing for institutional individuality.”

FOR MORE INFORMATION

WWW.CENTER.RPI.EDU

- Full project plans
- Monograph
- Progress reports
- Completed course planning tools
- Project contacts

The logo features a stylized mountain range in shades of green and yellow in the background. The text "Center for Academic Transformation" is overlaid on this background. "Center" is in a bold, dark green font, "for" is in a smaller, italicized, dark green font, "Academic" is in a large, dark blue font, and "Transformation" is in a large, dark blue font.

Center
for Academic
Transformation

Dr. Carol A. Twigg, Executive Director

**“IT’S NOT HOW FAST YOU RUN;
IT’S HOW YOU RUN FAST.”**



**ARE YOU TAKING FULL ADVANTAGE OF
INFORMATION TECHNOLOGY?**