TRANSFORMING LEARNING ENVIRONMENTS THROUGH COURSE REDESIGN
TODAY’S DISCUSSION

- The National Center for Academic Transformation
- Overview of the Methodology and Findings of the Program in Course Redesign
- Proven Models for Successful Redesign
Established in 1999 as a university Center at RPI funded by the Pew Charitable Trusts

Became an independent non-profit organization in 2003

Mission: help colleges and universities learn how to use technology to improve student learning outcomes and reduce their instructional costs
NCAT PROGRAMS

- Program in Course Redesign (PCR)
  - 30 institutions
- Roadmap to Redesign (R2R)
  - 20 institutions
- Colleagues Committed to Redesign (C2R)
  - 60 institutions
- State and System-based Programs
  - 50+ institutions
STATE- AND SYSTEM-BASED PROGRAMS

• Pilots
  – Hawaii
  – Ohio
  – Minnesota
  – South Dakota

• Programs
  – Maryland
  – Tennessee
  – Arizona
  – Mississippi
  – SUNY
  – Texas

• Prospects
  – Connecticut
  – CUNY
  – Georgia
  – Indiana
  – Louisiana
  – Virginia
TRADITIONAL INSTRUCTION

Seminars

Lectures
“BOLT-ON” INSTRUCTION
WHAT’S WRONG WITH THE LECTURE?

• Treats all students as if they are the same
• Ineffective in engaging students
• Inadequate individual assistance
• Poor attendance and success rates
• Students fail to retain learning
WHAT’S WRONG WITH MULTIPLE SECTIONS?

- In theory: greater interaction
- In practice: large class size
- In practice: dominated by the same presentation techniques
- Lack of coordination
- Inconsistent outcomes
ASSUMPTIONS THAT GET IN THE WAY

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

30 projects
50,000 students
WHAT DOES NCAT MEAN BY COURSE REDESIGN?

- Course redesign is the process of redesigning whole courses (rather than individual classes or sections) to achieve better learning outcomes at a lower cost by taking advantage of the capabilities of information technology.
- Course redesign is not just about putting courses online.
- It is about rethinking the way we deliver instruction in light of the possibilities that new technology offers.
WHY REDESIGN?

Look for courses where redesign will have a high impact:

- High withdrawal/failure rates
- Students on waiting lists
- Students turned away – graduation bottleneck
- Over enrollment of courses leading to multiple majors
- Inconsistency of preparation
- Difficulty getting qualified adjuncts
- Difficulty in subsequent courses
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
TEAM EFFORT IS KEY

Each team included
- Administrator
- Faculty experts
- Technology expertise
- Assessment assistance
IT IS POSSIBLE TO INCREASE LEARNING WHILE REDUCING COST

- 25 of 30 PCR projects improved learning; the other 5 showed equal learning.
- 24 measured course completion rates; 18 showed improvement.
- All 30 reduced costs by 37% on average, with a range of 15% to 77%.

Program in Course Redesign
WHAT HAPPENS TO THE SAVINGS?

• 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
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.”
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
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 readily available interactive software—used independently and in teams
- Mastery learning—not self-paced
- Increase on-demand, individualized assistance
- Automate only those course components that can benefit from automation—e.g., homework, quizzes, exams
- Replace single mode instruction with differentiated personnel strategies

Technology enables good pedagogy with large #s of students.
SUPPLEMENTAL MODEL

- Maintain the basic current structure
- Change the content so that more is available online
- Change interaction so that students are interacting more with the material
- Change the use of the time to reduce or eliminate lecturing and increase student interaction
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%
REPLACEMENT MODEL

- Blend face-to-face with online activities
- Determine exactly what activities required face-to-face and reduce the amount of time to focus only on those activities in class
- Provide 24/7 online interactive learning materials and resources
- Include online self-assessment activities with immediate feedback
SPANISH
University of Tennessee

CHALLENGES

• Inconsistent student preparation
• Inability to accommodate all who would like to take this course – bottleneck to graduation
• Inability to accommodate different learning styles
• Limited number of qualified instructors
• Time in class devoted to grammar and vocabulary – not expressive speaking and writing
<table>
<thead>
<tr>
<th>Traditional</th>
<th>Redesign</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 57 sections (~27)</td>
<td>• 38 sections (~54)</td>
</tr>
<tr>
<td>• Adjuncts + 6 TAs</td>
<td>• Instructor-TA pairs</td>
</tr>
<tr>
<td>• 100% in class</td>
<td>• 50% in class, 50% online</td>
</tr>
<tr>
<td>• $167,074 ($2931/section)</td>
<td>• $56,838 ($1496/section)</td>
</tr>
<tr>
<td>• $109 cost-per-student</td>
<td>• $28 cost-per-student</td>
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</tbody>
</table>

- Oral skills: significantly better performance
- Language proficiency & language achievement: no significant difference
- A second Spanish project: final exam scores in speaking, reading and listening were higher
EMPORIUM MODEL

- Move all classes to a lab setting
- Permit the use of multiple kinds of personnel
- Allow students to work as long as they need to master the content
- Can be adapted for the kinds of students at a particular institution
- Allow multiple courses the same time
- Include multiple examples in math
EMPORIUM MODEL
University of Alabama
PRE-CALCULUS MATH
University of Alabama

PROBLEMS

• No support for multiple learning styles
• No flexibility in instructional pace
• Lack of student success
  • D/F/W rates as high as 60%
• Very high course repeat percentage
• Negative impact on student retention
• Significant drain on resources
PRE-CALCULUS MATH
University of Alabama

- 30-50 minute group meetings weekly
- 3-4 hours in lab or elsewhere working independently using software that presents a series of topics covering specific learning objectives
- Practice problems and assessments that cover defined learning objectives
- Quizzes taken multiple times with immediate feedback
- Tests available on demand with a specified completion date
- Instructors and tutors available in lab to provide individualized assistance
<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Fall 1998</td>
<td>47.1%</td>
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<tr>
<td>Fall 1999</td>
<td>40.6%</td>
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<tr>
<td>Fall 2000</td>
<td>50.2%</td>
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<tr>
<td>Fall 2001</td>
<td>60.5%</td>
</tr>
<tr>
<td>Fall 2002</td>
<td>63.0%</td>
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<tr>
<td>Fall 2003</td>
<td>78.9%</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>76.2%</td>
</tr>
</tbody>
</table>

U of AL continues to add courses to emporium and maintain excellent student learning results.
OTHERS USING THE EMPORIUM

- Cleveland State Community College (TN)
- Jackson State Community College (TN)
- Louisiana State University
- Northeast State Technical Community College (TN) – Reading!
- University of Idaho
- University of Missouri – St. Louis
- University of North Carolina – Chapel Hill
- Virginia Tech University
- Wayne State University
FULLY ONLINE MODEL

• Moves all or most of the learning environment online
• Provides access to anyone, anywhere, anytime – on demand
• Allows international groups of students to interact easily and learn from each other
FULLY ONLINE MODEL
Fine Arts, Literature, Math, Psychology

Traditional
- Redesign one class
- Emphasize instructor-to-student interaction
- Instructor does all grading and provides all student feedback
- Single personnel strategy

Redesign
- Redesign whole course
- Emphasize student-to-student interaction and teaming
- Automate grading and student feedback
- Differentiated personnel strategy
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.
BUFFET MODEL

• Assess each student’s knowledge/skill level and preferred learning style
• Provide an array of high-quality, interactive learning materials and activities
• Develop individualized study plans
• Built in continuous assessment to provide instantaneous feedback
• Offer appropriate, varied human interaction when needed
A STREAMLINED REDESIGN METHODOLOGY
“A Menu of Redesign Options”

• Five Models for Course Redesign
• Five Principles of Successful Course Redesign
• Cost Reduction Strategies
• Course Planning Tool
• Course Structure Form
• Five Models for Assessing Student Learning
• Five Critical Implementation Issues
• Planning Checklist
FACULTY BENEFITS

- Increased opportunity to work directly with students who need help
- Reduced grading
- Technology does the tracking and monitoring
- More practice and interaction for students without faculty effort
- Ability to try different approaches to meet different student needs
- Opportunity for continuous improvement of materials and approaches
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Carolyn Jarmon, Ph.D.
cjarmon@theNCAT.org

www.theNCAT.org