REDESIGNING STUDENT LEARNING ENVIRONMENTS
TODAY’S DISCUSSION

- Overview of the Methodology and Findings of the Successful Redesign Projects
- 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
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
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.
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.

50,000 students
30 projects
SUMMARY OF RESULTS

• 25 of the original 30 showed improvement; 5 showed equal learning

• 24 measured retention; 18 showed improvement

• All 30 showed cost reduction

• Results in subsequent national and state and system programs have continued to show comparable results
WHY REDESIGN?

Look for courses where redesign will have a high impact – let’s make a difference:

- 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
TEAM EFFORT IS KEY

Each team included
- Administrator
- Faculty experts
- Technology expertise
- Assessment assistance
NCAT METHODOLOGY: Relevance and Utility

- **Discipline**: math & literature
- **Age**: traditional & working adults
- **Institution**: small & large
- **Location**: on-campus & at a distance
- **Redesign**: current & new courses
- **Level**: introductory & advanced
TAKING COURSE REDESIGN TO SCALE

- The Roadmap to Redesign (R2R)
  2003 – 2006 (20 institutions)
- Colleagues Committed to Redesign (C2R)
  2006 - 2009 (60 institutions)
- Programs with Systems and States
  2006 – present (~80 institutions)
- The Redesign Alliance
  2006 – present (70+ institutions)
- Changing the Equation
  2009 – 2012 (38 institutions)
120 REDESIGNED COURSES

- 160,000 students nationwide
- Improved student learning: 72%
  Equivalent student learning: 28%
- Cost reduction: 37% (9% to 77%)
  Annual savings: ~$9.5 million
- Other outcomes
  - Increased course-completion rates
  - Improved retention
  - Better student attitudes toward the subject
  - Increased student satisfaction with the mode of instruction
QUANTITATIVE

• Mathematics
  – Developmental Math
  – Pre-calculus Math
  – College Algebra
  – Discrete Math
  – Introductory Algebra
  – Elementary Algebra
  – Beginning Algebra
  – Intermediate Algebra
  – Linear Algebra

• Statistics
  – Business Statistics
  – Introductory Statistics
  – Elementary Statistics
  – Economic Statistics

• Computing
  – Computer Programming
  – Information Technology Concepts
  – Computer Literacy
  – Information Literacy
  – Tools for the Information Age
• SCIENCE
  - Anatomy and Physiology
  - Astronomy
  - Biology
  - Ethnobotany
  - Chemistry
  - Geology

• SOCIAL SCIENCE
  - American Government
  - Macro and Microeconomics
  - Psychology
  - Sociology
  - Urban Affairs
<table>
<thead>
<tr>
<th>HUMANITIES</th>
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<tr>
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<td>• Developmental Writing</td>
<td>• Education: The Curriculum</td>
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<td>• English Composition</td>
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<td>• Organizational Behavior</td>
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<td>• Understanding the Visual and Performing Arts</td>
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<td>• History of Western Civilization</td>
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<td>• Great Ideas in Western Music</td>
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<td>• Spanish</td>
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<td>• World Literature</td>
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<td>• British Literature</td>
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<td>• Women and Gender Studies</td>
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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
- **Linked Workshop** – JIT workshops linked to college level course
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
BIOLOGY
University of Massachusetts

CHALLENGES

• Inconsistent student preparation
• Poor class attendance
• Lectures that repeated the contents of the textbook
• High dissatisfaction with course by both faculty and students
BIOLOGY
University of Massachusetts

- Continue to have large class meetings
- Require short pre-tests before the start of the first class each week and these are available for the entire term as review
- Receive small number of points for taking the online quiz
- Provide 24/7 online study materials
- Include small group interactions during class focused on applied biology problems
- Class periods are now used to discuss biology problems, rather than lecture
In spite of more difficult questions, scores on exams in the redesigned course averaged 73% vs. 61% in the traditional course.

23% of the exam questions in the traditional model required reasoning or problem solving skills vs. 67% in the redesigned course.

Attendance averaged 89.9% in the redesigned course vs. 67% in the traditional course.
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
FIRST-YEAR SPANISH (Replacement Model)

- Increase active speaking via in-class interaction
- Use technology to support skill practice
- Provide immediate feedback online
- Increase student and instructor computer literacy
- Encourage collaborative learning, both online and in class
Traditional
• 57 sections (~27)
• Adjuncts + 6 TAs
• 100% in class
• $167,074 ($2931/section)
• 1529 students @ $109

Redesign
• 38 sections (~54)
• Instructor-TA pairs
• 50% in class, 50% online
• $56,838 ($1496/section)
• 2052 students @ $28

✓ 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 depending upon student interests and majors
Class size increased from 35 to 70, reducing costs by ~30%.
CHALLENGES

- Inconsistent student academic preparation
- Success rates sometimes as low as 50%
- Inadequate student retention
- Inconsistent student outcomes, since taught in multiple sections
Traditional course – 3 50-minute lectures to 35-40 students in each section weekly

Redesigned course

1 75-minute session with 75 students weekly to provide overview, assignment review, troubleshoot, and keep students on track

2 75-minute required labs in Math Technology Learning Center weekly

Interactive software with videos, examples, exercises, homework and low stakes quizzing

Individual assistance when needed
COLLEGE ALGEBRA
University of Missouri – St. Louis

OUTCOMES

• Increase in number of students earning A or B, from 32% in traditional to 56% in redesign
• Decrease in DFW rate from 36% in 2002-03 to 21.6% in 2005-06 and success continues.
• Cost savings of 30%
• Now redesigning Calculus and Statistics using the redesign model in the same Math Lab
<table>
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<tr>
<th>Semester</th>
<th>Success Rate</th>
<th>Semester</th>
<th>Success Rate</th>
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<tr>
<td>Fall 1998</td>
<td>47.1%</td>
<td>Spring 1999</td>
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<td>Spring 2000</td>
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<td>Spring 2004</td>
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<td>66.7%</td>
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<tr>
<td>Fall 2008</td>
<td>78.1%</td>
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EMPORIUM MODEL

• Very effective with developmental studies
• Developmental Math
  – Cleveland State Community College
  – Jackson State Community College
  – Chattanooga State Community College
  – 38 community colleges in Changing the Equation
• Developmental Reading
  – Northeast State Community College
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
FINE ARTS
Florida Gulf Coast University

CHALLENGES

• Significant inconsistency among multiple sections
• Difficulty finding either faculty or adjuncts with the breadth of knowledge in all of the humanities
• Poor performance in this course that is required by all freshmen
• Growth in students and no money for new faculty
FINE ARTS
Florida Gulf Coast University

• Each module covers one aspect of the Humanities
• Each module is designed and monitored by a faculty expert in that academic area
• One course coordinator manages the course of 400+ students each term
• Undergraduate peer tutors and adjuncts guide discussion groups and evaluate longer papers
• 24/7 interactive learning resources are available anytime, any place
FINE ARTS
Florida Gulf Coast University

Traditional
- 25 sections (~30); 6 sections (~15) = 800
- Taught mainly by adjuncts
- “Course drift”
- $132 cost-per-student

Redesign
- Single section (~950)
- Taught by 1 faculty, 1 course coordinator, 20 preceptors
- Consistent & coherent
- $81 cost-per-student

✓ Average exam scores increased from 70% to 85%
✓ Number of A’s/B’s increased from 31% to 75%
✓ DFW rate decreased from 45% to 11%
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
STATISTICS
Ohio State University

CHALLENGES

• Previous redesign using IT increased the cost
• Students had highly variable learning styles
• Lectures were poorly attended
• 20% of the students repeat the course each quarter even though most have satisfactorily completed initial modules
• Too many emails for faculty
• Faculty time was used inefficiently
• Inconsistency among sections
Students use online assessment by Felder and Solomon.
There are multiple routes to established outcomes for each module.
Students are assisted in thinking about how they approach learning and what mode is easiest for them.
Students file a learning plan for each module.
Various kinds of learning activities using websites, software, video lectures, small group discussions, individual and group projects.
Ohio State University

OUTCOMES

- Redesign students had greater success on common exams (mean = 78.3) than traditional students (mean = 70).
- The number of students needing to retake the course was reduced from 33% to 12%.
- Cost reduction from $191 per student in the traditional to $132 per student in the redesign.
LINKED WORKSHOP MODEL

- Retain basic structure of the college-level course, particularly the number of class meetings
- Replace remedial/developmental course with just-in-time (JIT) workshops
- Design workshops to remove deficiencies in core course competencies
- Workshops consist of computer-based instruction, small-group activities and test reviews to provide additional instruction on key concepts
- Students individually assigned software modules based on results of diagnostic assessments
- Workshops facilitated by students who have previously excelled in core course; students trained and supervised by core course faculty
- JIT workshop activities designed so students use concepts during next core course class session, which in turn helps them see the value of the workshops and motivates them to do workshop activities
DEVELOPMENTAL MATH
Austin Peay State University

Fundamentals of Math
- Traditional: 33% of students who took the developmental and the college-level course sequentially were successful.
- Redesign: 70% of students who would have been assigned to a developmental course were successful in the course linked to a workshop.

Elements of Statistics
- Traditional: 23% of students who took the developmental and the college-level course sequentially were successful.
- Redesign: 52% of students who would have been assigned to a developmental course were successful in the course linked to a workshop.
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
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
REDESIGNING STUDENT LEARNING ENVIRONMENTS

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