COURSE REDESIGN – PARADOX OR NEW PARADIGM FOR STANDARDS-BASED MATH?

AMATYC Annual Conference
November 20, 2008
Panelists

- Judy E. Ackerman
- Robert L. Carson
- Byron A. Dyce
- Susan M. Knights
- Stephanie Pepin
Quick History of Course Redesign

- Goal of Course Redesign is to improve student learning and reduce costs
Quality Improvement Techniques

Quality Improvement Techniques, Round I
- Continuous Assessment and Feedback
- Increased Interaction among Students
- Online Tutorials
- Undergraduate Learning Assistants

Additional Quality Improvement Techniques, Round II and Round III
- Individualized, On-demand Support
- Structural supports that Ensure Engagement and Progress
Cost Savings Techniques

- Online Course Management Systems
- Online Automated Assessment of Exercises, Quizzes and Tests
- Online Tutorials
- Shared Resources
- Staffing Substitutions
- Reduction of Space Requirements
- Consolidation of Sections and Courses
- Lower Cost Course Materials
Redesign Institutional Readiness Criteria

1. Desire to control or reduce costs and increase academic productivity.
2. Demonstrated commitment to use technology to achieve strategic academic goals.
3. Computing firmly integrated into the campus culture.
4. Technology used for functions previously performed by personnel for administrative functions and/or academic functions.
5. Mature information technology (IT) organization(s) to support faculty integration of technology into courses.
6. Demonstrated commitment to learner-centered education.
7. Commitment to learner readiness to engage in IT-based courses.
8. Commitment to providing needed support for the redesign project.

Redesign Course Readiness Criteria

1. Changes in the course will have a high impact on the curriculum.
2. Decisions about curriculum in the department, program, or school are made collectively, not by individual faculty members.
3. Faculty are able and willing to incorporate existing curricular materials in order to focus work on redesign issues rather than materials creation.
4. Faculty members have an understanding of and some experience with integrating elements of computer-based instruction into existing courses.
5. Course learning outcomes and a system for measuring their achievement been identified.
6. Project participants have the requisite skills to conduct a large-scale project.
7. Faculty members involved in project have an understanding of learning theory.
8. Campus is committed to a partnership among faculty, IT staff and administrators in planning and execution of the redesign.

Six Models for Course Redesign

- Supplemental Model
- Replacement Model
- Emporium Model
- Fully Online Model
- Buffet Model
- Linked Workshop Model

Stephanie Pepin

Montgomery College

Intermediate Algebra for Liberal Arts

Supplemental Model
Before Course Redesign

- 32 sections fall 2006
- Approx. 28 sections Spring 2007
- 1800 students annually 2007 - 2008
- Traditional, lecture based classes
- Taught entirely by FT and PT instructors
Problems

- Teacher centered
- Insufficient support for multiple learning styles
- Inconsistent coverage of topics
- No flexibility in instructional pace
- Lack of student success
  - D/F/W rates as high as 55*%
- Very high course repeat percentage
- Negative impact on student retention
- Significant drain on resources
Identify an alternative structure that

- has faculty/instructor/staff support
- is learner centered
- supports multiple learning styles
- provides consistent presentation and assessment of material
- allows students to work at own pace*
- increases student success
- reduces resource demands
Proposed Approach

- "Substitution" Model
- Retains basic structure of the traditional course; supplementing with technology based activities to encourage greater student engagement with course
Pending Modifications

- 30-50 minute “classes” that introduce students to topics and integrate the topics into the overall course objectives
- 3-4 hours in dedicated Math* Learning lab or elsewhere working independently using course software that presents a series of topics covering specific learning objectives
- Redesign of current computer lab
Advantages of New Format

- Learner centered
- Software supports multiple learning styles
- Consistent presentation of material
- Individualized tutorial support available
More Advantages

- Students can work at own pace*
- Students can work in lab or at home
- Software provides instant feedback on work
- Homework, quizzes, tests/exams* computer graded
- Software records all student activity
Implementation Issues

- “No Teacher” Syndrome
- Student Engagement
- Scheduling Deadlines, Tests, Etc.
- Instructor perceived “Loss of Control”
- Staff Scheduling
- Data Management / IT support
- Instructor Buy-In
- Instructor Training
### Pass Rate in next courses

<table>
<thead>
<tr>
<th>Rockville</th>
<th>Grade in MA 101</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D,F,W,I</th>
<th># of Students</th>
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<td>Grade in MA 101</td>
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<tr>
<td>A</td>
<td>A</td>
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<td>Grade in MA 116</td>
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<td>A</td>
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<tr>
<td>B</td>
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<td>C</td>
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<td>26.8%</td>
<td>58.9%</td>
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<tr>
<td>Total</td>
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<td>23.0%</td>
<td>23.0%</td>
<td>40.3%</td>
<td>139</td>
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</table>
Additional information

- Data Set #1 - Students enrolled in MA 101 in Fall 07 for whom assessment data from the common final exam was available,

- Data Set #2 - All students enrolled in MA 101 in Fall 07, regardless of whether assessment data from the common final was available.

- Data Set #3 - All students who passed MA 101 in Fall 06, prior to the course redesign of MA 101, and who subsequently enrolled in either MA 110 or MA 116 in Spring 07.
From Data Set #1

- Nearly 40% of the students who passed MA 101 with a C or better do not enroll in a math course the following semester.
- 43% of the students who achieved a C or better in MA 101 were unable to successfully complete their math course the following semester.
- Students did poorly on the combined four questions on the common final for which data was collected.
- Nearly 80% of the students who achieved a C or better in MA 101 were able to successfully complete MA 110 the following semester.
- Approximately 60% of students who passed MA 101 were able to successfully complete MA 116 the following semester.

From Data Set #2,

- 43% of the students who achieved a C or better in MA 101 were able to pass MA 116 the following semester.
“Must Haves” for Redesign

- The support of both the department administration and upper administration.
- A strong-willed director/course coordinator.
- A core group of instructors and professors dedicated to working hard to make course redesign work.
- Space and computers for a learning lab.
- A willingness on the part of everyone involved to be flexible and CHANGE.
- A purpose and an overall plan for change.
Next Steps for spring 2009

- Identifying funds/resources for fall 2009 pilot for MA09,1 Elementary Algebra
- Computer lab redesign
- Alternate software selection and training
Pending Issues

- How much change?
- Redesign model to include mandatory lab?
- Faculty workload distribution questions
- Availability of technology resources on all three campuses
Conclusions

- Redesign process is unique to each college
- Pilot sections will offer insight as to modifications necessary for full implementation.
- Technology is a fundamental key to redesign success
Byron Dyce
Santa Fe Community College
Pre-Algebra through College Algebra
Robert Carson

Hagerstown Community College

College Algebra
College Algebra Redesign Project

- Colleagues Committed to Redesign (C2R)
- Provides support and expertise to institutions redesigning course delivery to
  1. Increase use of technology to improve student learning and
  2. Reduce cost of course delivery / student
- Funded by FIPSE Grant: October 2006 – September 2009
Fall 2007
MAT 101

- 3 Sections of the Redesign Model
- 1 Online Section
- 10 Sections of the Traditional Lecture
- All Sections took a 25 point common assessment
Each section of 24 students had:

- 1.5 hrs of lecture each week
- 1.5 hrs with specialized software each week
  with the instructor available for individualized instruction
- Access to mathematics tutors in math lab

Each week students completed homework assignments

Testing was done in the testing center
Grading

- 10% - Homework Assignments (27)
- 10% - Quizzes (8)
- 10% - Participation (attendance, etc.)
- 40% - Exams (4 tests)
- 25% - Final Exam
- 5% - Instructor Material (individualized assessment from instructor)
Results We Noticed

- Students with grades of C or higher averaged at least 45 hours on the online portion of the class.
- Students were doing the homework.
- Attention to details and not following directions were the major problems with the student software interface.
Changes in Mean College Algebra Course Grade

- Fall 2006 GPA: 2.3
- Fall 2007 GPA: 2.48
- Fall 2007 Redesign GPA: 2.59
Mathematics
CAAP Scores (out of 80)

<table>
<thead>
<tr>
<th></th>
<th>National CAAP Mean</th>
<th>Fall 2006</th>
<th>Fall 2007</th>
<th>Fall 2007 Redesign</th>
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<tbody>
<tr>
<td>Total Score</td>
<td>56.2</td>
<td>57.82</td>
<td>58.22</td>
<td>57.37</td>
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Spring 2008

- Combined section of 40 students in lecture
- Met with groups of 20
  - For specialized software with individualized instruction
  - For 2.5 hrs weekly
- All College Algebra students used the redesign model
- 7 sections were taught with redesign model (section max 40)
- 3 sections taught totally online (section max 20)
- Common examinations
### Table 2: College Algebra: Effect of Redesign On Institutional Data Measures

<table>
<thead>
<tr>
<th></th>
<th>% W</th>
<th>% No-show Fs</th>
<th>% Success (A,B,C)</th>
<th>% Difference</th>
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<tbody>
<tr>
<td>Fall 2007 (n=309) Traditional</td>
<td>8.0</td>
<td>12.3</td>
<td>62.3</td>
<td>+14.5% vs. Fall 2007</td>
</tr>
<tr>
<td>Fall 2007 (n=71) Redesign Pilot</td>
<td>5.6</td>
<td>7.0</td>
<td>73.6</td>
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<tr>
<td>Sp 2007 (n=257) Traditional</td>
<td>12.5</td>
<td>12.8</td>
<td>58.4</td>
<td>+16.4% vs. Spring 2007</td>
</tr>
<tr>
<td>Sp 2008 (n=265) Redesign</td>
<td>6.7</td>
<td>11.7</td>
<td>68.0</td>
<td>+19.1% vs. NCCBP</td>
</tr>
<tr>
<td>NCCBP</td>
<td>21.9</td>
<td></td>
<td>57.1</td>
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Unit Planning 2009
Cost of Instruction per student
Traditional vs. Redesign
(Does not include facilities or computer resources)

<table>
<thead>
<tr>
<th></th>
<th>Actual Cost Traditional Delivery Fall 2006</th>
<th>Projected Cost Redesign Spring 2008</th>
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<tbody>
<tr>
<td>Traditional</td>
<td>$211</td>
<td>$97</td>
</tr>
<tr>
<td>Projected</td>
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</table>
Cost of Instruction per student

Traditional vs. Fully-Implementated Redesign
(Does not include facilities or computer resources)

- **Actual Cost Traditional Delivery Fall 2006**: $211
- **Actual Cost Redesign Spring 2008**: $112
Design for Fall 08

- Four hour concept
- Combined section of 40 students for 1.5 hrs. weekly lecture
- Meet with group of 20
  - For specialized software with individualized instruction
  - For 1.5 hrs weekly
- Students required to go to open lab to do an additional 1 hour of work online
Susan Knights

Boise State University

Developmental Math Program

Emporium Model

with mandatory attendance
Institution’s Goals

- Uniform Curriculum
  - Consistent material
  - Identical weekly homework and quizzes
  - Common quarterly exams
  - Common final
  - Grading rubrics

- Space Issues
  - Return of the math bldg to the math dept
  - Addition of 3000 sq ft MLC
Results to Date

- **Student Learning**
  - Increased course completion rate ~45% to ~70%
  - Increase in independent learners
  - Every learning style accommodated

- **Costs**
  - **First 3 Years**
    - Hybrid instructors paid 1.5 credits plus hourly lab time
  - **3rd - 6th Year**
    - Addition of 8-12 graduate students as instructors
  - **7th Year**
    - Hybrid instructors paid flat fee for 1 hour class + 3 hour lab
Lessons Learned

- **Obstacles**
  - Lack of communication and lack of a common goal
  - Educating faculty and advisors in other departments
  - Getting students to change their concept of their role in the learning process

- **Positive Surprises**
  - Decrease in number of students repeating courses
  - Increase in student-teacher communication
  - Intercollegiate communication among developmental faculty
  - Students looking for redesigned courses for the next level
QUESTIONS