Focusing on Student Success: Assessment of Learning Outcomes in Blended Environments

Traci Temple, Ph.D.
Course Redesign

Presentation Objectives

- DELTA's redesign program
- Students learning outcomes
- Students who benefit the most
- Students successfully transitioning to more advanced study
Course Redesign
DELTA’s program

1. Precalculus Algebra and Trigonometry
2. Engineering Statics
3. Introduction to Statistics
4. College Physics – KitLab
5. Precalculus Algebra
6. Calculus I
7. Applied Differential Equations
8. Physics for Engineers and Scientists
11. Microbiology
12. World Architecture
Course Redesign

Shared characteristics

- Gateway – Critical path
- “High-needs”
- 300+ annual enrollment
- Large lecture or multi-section
- Multiple instructors
- >25-35% students receive D/F grades
- Limited faculty resources
- Passive learning
Course Redesign
Introduction to Statistics (ST311)
Course Redesign
Introduction to Statistics (ST311)

Why “Flip”?
- Leverage technologies for content delivery
- Restructure student learning time to be more efficient

<table>
<thead>
<tr>
<th>Comparison of ST311 Course Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prior to Redesign</strong></td>
</tr>
<tr>
<td>Lecture with Activities</td>
</tr>
<tr>
<td>(65 students for 50 minutes)</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
<tr>
<td>(65 students for 50 minutes)</td>
</tr>
<tr>
<td><strong>Redesigned</strong></td>
</tr>
<tr>
<td>Individual Learning</td>
</tr>
<tr>
<td>(individual students interacting with online content)</td>
</tr>
<tr>
<td>Individual Learning</td>
</tr>
<tr>
<td>(individual students interacting with online content)</td>
</tr>
<tr>
<td>Face-to-face activities</td>
</tr>
<tr>
<td>(30 students for 50 minutes)</td>
</tr>
</tbody>
</table>
Course Redesign
Introduction to Statistics (ST311)

ST311 Fall & Spring Term DFW Rates
Before and After Redesign

DFW Rates


Redesign

Fall DFW
Spring DFW
Course Redesign

Introduction to Statistics (ST311)

ST 311 Overall GPAs by Semester

- Average GPA
- Year

Semester
- Fall
- Spring
Course Redesign

Introduction to Statistics (ST311)

Number of Observations Read: 624
Number of Observations Used: 527

<table>
<thead>
<tr>
<th>R-Square</th>
<th>Coef Var</th>
<th>Root MSE</th>
<th>MIDTERM1 Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.309011</td>
<td>16.03649</td>
<td>11.85757</td>
<td>73.94118</td>
</tr>
</tbody>
</table>

| Parameter | Estimate   | Standard Error | t Value | Pr > |t| |
|-----------|------------|----------------|---------|-------|---|
| Intercept | 20.97020408| 3.89644713     | 5.38    | <.0001 |
| quiz1     | 2.48330859 | 0.32927755     | 7.54    | <.0001 |
| quiz2     | 1.63044920 | 0.36050273     | 4.52    | <.0001 |
| quiz3     | 0.30820746 | 0.26011519     | 1.18    | 0.2366 |
| quiz4     | 0.24723395 | 0.25170188     | 0.98    | 0.3264 |
| quiz5     | 0.71451881 | 0.34670876     | 2.06    | 0.0398 |
| quiz6     | 1.48445150 | 0.31276309     | 4.75    | <.0001 |
Course Redesign
Introduction to Statistics (ST311)

Number of Observations Read: 624
Number of Observations Used: 519

| Parameter | Estimate | Standard Error | t Value | Pr > |t| |
|-----------|----------|----------------|---------|-------|---------|
| Intercept | 30.26195987 | 4.89071532 | 6.19 | <.0001 |
| quiz7     | 2.42328906 | 0.47612693 | 5.09 | <.0001 |
| quiz8     | 0.95897144 | 0.31204963 | 3.07 | 0.0022 |
| quiz9     | 0.97288281 | 0.36300959 | 2.68 | 0.0076 |
| quiz10    | 0.72936602 | 0.43362989 | 1.68 | 0.0932 |
| quiz11    | 0.38597723 | 0.28068717 | 1.38 | 0.1697 |
Course Redesign
Introduction to Statistics (ST311)

Number of Observations Read 624
Number of Observations Used 588

| Parameter   | Estimate   | Standard Error | t Value | Pr > |t| |
|-------------|------------|----------------|---------|------|---|
| Intercept   | 25.77762778| 4.68441924     | 5.50    | <.0001| |
| MIDTERM1    | 0.79345424 | 0.05801805     | 13.68   | <.0001| |
| MIDTERM2    | 0.60408366 | 0.06016594     | 10.04   | <.0001| |
| quizall     | 0.30105222 | 0.05751825     | 5.23    | <.0001| |
Course Redesign
Precalculus Algebra & Trigonometry (MA111)
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

Technology Used
• Moodle
• LiveScribe
• Videos (example problems)
• Static text documents (PDF)
• Online low-stakes quizzes
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

MA111 DFW Fall Term Rates
After Course Redesign

DFW Rate


0.34 0.25 0.21 0.15 0.13
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

MA111 Fall Term ABCDF Rates After Redesign

- A Rate
- B Rate
- C Rate
- DF Rate

2005 PreLCR
2006 PreLCR
2009
2010
2011
2012
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

MA111 Spring Term DFW Rates After Course Redesign

- 2005 Pre-LCR: 0.34
- 2006 Pre-LCR: 0.38
- 2010: 0.3
- 2011: 0.36
- 2012: 0.22
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

MA111 Spring Term ABCDF Rates After Course Redesign

<table>
<thead>
<tr>
<th>Year</th>
<th>A Rate</th>
<th>B Rate</th>
<th>C Rate</th>
<th>DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005 Pre-LCR</td>
<td>0.17</td>
<td>0.23</td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td>2007 Pre-LCR</td>
<td>0.27</td>
<td>0.28</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>0.32</td>
<td>0.21</td>
<td>0.15</td>
<td>0.09</td>
</tr>
<tr>
<td>2011</td>
<td>0.32</td>
<td>0.23</td>
<td>0.3</td>
<td>0.09</td>
</tr>
<tr>
<td>2012</td>
<td>0.27</td>
<td>0.22</td>
<td>0.22</td>
<td></td>
</tr>
</tbody>
</table>
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

Students who took MA111 redesigned or traditional lecture course
Course Redesign
Precalculus Algebra & Trigonometry (MA111)

“[The examples] gave me an idea /understanding before we went over it in class, or helped solidify the material after the lecture.”
Course Redesign
Tracking students to Calculus (MA141)

MA141 Fall Term DFW Rates
After MA111 Course Redesign

2008 PreLCR 2009 PreLCR 2010 2011 2012

DFW Rate
Course Redesign
Tracking students to Calculus (MA141)

MA141 ABCDF Rates After MA111 Course Redesign

- A Rate
- B Rate
- C Rate
- DF Rate

* Post MA111 LCR
Course Redesign
Tracking students to Calculus (MA141)

Attempts Required to Pass Course

Preparatory Course: Redesigned
- MA 141
  - 90.3%
  - 9.2%
  - 0.5%

Preparatory Course: Traditional
- 80.4%
  - 16.5%
  - 2.4%
  - 0.5%
  - 0.2%
Course Redesign
Statics (MAE 206)
Course Redesign
Statics (MAE 206)

Technology Used
• Moodle
• LiveScribe
• Mediasite
• Clickers
• Wikis
• Matlab
Course Redesign
Statics (MAE206)

MAE206 Fall Term DFW Rates After Course Redesign

<table>
<thead>
<tr>
<th>Year</th>
<th>DFW Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.26</td>
</tr>
<tr>
<td>2007</td>
<td>0.21</td>
</tr>
<tr>
<td>2008</td>
<td>0.13</td>
</tr>
<tr>
<td>2009</td>
<td>0.17</td>
</tr>
<tr>
<td>2010</td>
<td>0.14</td>
</tr>
<tr>
<td>2011</td>
<td>0.14</td>
</tr>
<tr>
<td>2012</td>
<td>0.15</td>
</tr>
</tbody>
</table>
Course Redesign
Statics (MAE206)

MAE206 Fall Term ABCDF Rates After Course Redesign

- A
- B
- C
- DF

Course Redesign
Statics (MAE206)

MAE206 Spring Term DFW Rates
After Course Redesign

- Phase 1
- Phase 2
- Phase 3
Course Redesign
Statics (MAE206)

MAE206 LCR Phase 3: Spring Term DFW Lecture and LCR Course Comparisons
Course Redesign
Statics (MAE206)

MAE206 LCR Phase 3: Spring Term ABCDF Rates
Lecture and LCR Course Comparisons

- A Rate
- B Rate
- C Rate
- DF Rate

<table>
<thead>
<tr>
<th>Course Type</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCR</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Course Redesign
Statics (MAE 206)

Students who took MAE206 redesigned or traditional lecture course

- Redesigned: 92.5% first attempt, 6.9% second attempt, 0.6% third attempt
- Traditional: 91.8% first attempt, 8% second attempt, 0.2% third attempt
# Course Redesign

## Statics (MAE206)

### Probability of Success by GPA

<table>
<thead>
<tr>
<th>GPA</th>
<th>LCR</th>
<th>Non-LCR</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>.42</td>
<td>.28</td>
<td>.14</td>
</tr>
<tr>
<td>2.25</td>
<td>.55</td>
<td>.40</td>
<td>.15</td>
</tr>
<tr>
<td>2.30</td>
<td>.57</td>
<td>.42</td>
<td>.15 (max)</td>
</tr>
<tr>
<td>2.50</td>
<td>.67</td>
<td>.53</td>
<td>.14</td>
</tr>
<tr>
<td>2.75</td>
<td>.78</td>
<td>.65</td>
<td>.12</td>
</tr>
<tr>
<td>3.00</td>
<td>.85</td>
<td>.76</td>
<td>.09</td>
</tr>
<tr>
<td>3.25</td>
<td>.91</td>
<td>.84</td>
<td>.06</td>
</tr>
<tr>
<td>3.50</td>
<td>.94</td>
<td>.90</td>
<td>.04</td>
</tr>
<tr>
<td>3.75</td>
<td>.97</td>
<td>.94</td>
<td>.03</td>
</tr>
<tr>
<td>4.00</td>
<td>.98</td>
<td>.96</td>
<td>.02</td>
</tr>
</tbody>
</table>
“39% of students cited the notes and online examples as THE most important element in their learning.”

“As many as 70% of students say their attendance improved because of daily quizzes.”
Course Redesign
Tracking students to Mechanics (MAE208)

MAE208 Spring Term DFW Rates After MAE 206 Course Redesign
(includes students enrolled in lecture and LCR)
Course Redesign
Tracking students to Mechanics (MAE208)

MAE208 Fall Term DFW Rates
After MAE 206 Course Redesign
(includes students enrolled in lecture and LCR)
Course Redesign
Tracking students to Mechanics (MAE208)

MAE208 ABCDF Rates After MAE206 Course Redesign

ABCDF Rates for Students in MAE206 Lecture and LCR

Years Including Spring and Fall Terms

- A Rate
- B Rate
- C Rate
- DF Rate
Course Redesign
Tracking students to Mechanics (MAE208)

Students who were enrolled in the MAE206 redesigned course and moved on to MAE208
Course Redesign

Final Thoughts

**LCR is better**

- Notes and online examples as THE most important element in their learning
- Attendance improved because of in-class activities
- More students in lecture skipped final exams, failed course
- Less students drop
- Higher student satisfaction
- Prepared to tackle homework
- Students in redesigned courses want another redesigned course
- Students in lecture courses want another lecture
- No single format can meet the needs of all the students
Course Redesign
Thank You!

Contact:
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