A Story of Redesign Success --Phase I

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Greenville Technical College has instituted significant changes to the developmental mathematics program, aiming to improve student success. These changes include homework expectations, teaching practices, testing and assessment, communication, and training. The program’s results will be shared in this presentation, along with key components that contribute to student success in mathematics.
Redesigning Developmental Math

- Context
- Prelude
- Momentum
- Initial Steps
- Pilots & Results
- Decisions & Implementation
- Current Focus and Efforts
- Lessons to Remember
4 campuses – 15,000 students

**Developmental math courses:** (189 sections)
- MAT 031 (Basic Math I) - 29 Sections
- MAT 032 (Basic Math II) - 50 Sections
- MAT 101 (Beginning Algebra) - 70 Sections
- MAT 102 (Intermediate Algebra) - 40 Sections

**Developmental math instructors:** (031/032/101)
- 10 Full-time
- 35 Adjunct

**Curriculum math instructors:** (102)
- 18 Full-time
- 20 Adjunct

**Class size:** 25-32
Developmental math course options:

- **Pace**
  - Full term
  - Fast track
  - Late start

- **Delivery**
  - Traditional Face-to-Face
    - *Online homework strongly recommended but optional*
  - Lab-Assisted
    - *Lecture and lab mix*
  - Online
    - *On campus proctored tests*
Success rates consistently low (around low 40%)

Weakening performance in curriculum math courses

Discontent and controversies coming from the curriculum math instructors

College concerns due to low persistence and program completion rates
### Momentum

- **National Efforts**
- **(Common Core Standards)**
- **South Carolina Course Alignment Project Efforts**
- **Title III Grant**
  - Goal: Increase achievement and retention in developmental studies by 10% within 5 years
- **Achieving the Dream Initiatives**
  - Brought attention to MAT 102
- **College-Wide and Division Focus on learning outcomes and assessment data**
“Unlock Your Future” Foci

Title III

Supporting faculty to

Develop Professionally and work together to

Revise course curricula to incorporate:

• Active/Engaged Learning
• Extend Time on Task
• Integrate Technology
• Promote Critical Thinking
• Incorporate outcomes assessment

designed to support student learning and success as evidenced by increases in persistence, retention and passing grades (70%).
Initial Steps

• Concurrent Changes
  • Electronic early alert system
  • New learning commons
  • Technology in classrooms
  • Laptop carts
  • Additional computer lab
  • Coaches/tutors
  • Curriculum changes
Initial Steps

- Data Collection
- Research
  - teaching and learning models
  - redesign approaches
  - software
- Discussions and Feedback
- Pilots
- Decisions
- Implementation of changes
Research

- Teaching models
  - Self-Regulated Learning SRL
  - Key Cognitive Strategies for College and Career Success
  - Contextual Learning

*Zimmerman (Self Reflection)*
*Conley (KCS for College and Career Success)*
*Willingham (*Why Don’t Students Like School*)*
Research

- Redesign models
  - Modularized
  - Emporium
  - Flipped

Best Practices in Redesign, compiled by Kathy Almy
Research

- Software models
  - MyMathLab
  - Hawkes
  - ALEKS

Comparative document
Faculty Feedback

- Math background
- School habits
- Life
- Maturity
- Standards
- Textbook/software
- Teaching
## Faculty Feedback

<table>
<thead>
<tr>
<th>Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math background</td>
</tr>
<tr>
<td><strong>Standards</strong></td>
</tr>
<tr>
<td><strong>Teaching</strong></td>
</tr>
<tr>
<td><strong>Software/Textbook</strong></td>
</tr>
<tr>
<td><strong>Maturity</strong></td>
</tr>
<tr>
<td><strong>School habits</strong></td>
</tr>
</tbody>
</table>
Why use math software for math homework?

- **For the students:**
  - Provides immediate assistance and feedback
  - Available 24/7
  - Provides accountability

- **For instructors:**
  - Provides automated grading of homework
  - Frees classrooms for instruction
  - Provides due date enforcement and thus encourages students’ preparedness for classroom instruction
Which math software, if any, would make a difference for us?
### Pilots & Results

**Fall 2010**
**7 pilot team instructors**
**16 exploratory pilot class sections**

- 4 MAT 101 sections  
  (2 instructors)  
  using Software 1

- 4 MAT 101 sections  
  (1 instructor)  
  using Software 2

- 5 MAT 101 sections  
  (2 instructors)  
  using Software 3

- 3 MAT 102 sections  
  (2 instructors)  
  using Software 2
Spring 2010
6 pilot team instructors
13 pilot class sections

- 4 MAT 101 sections using Software 1
  (2 instructors)

- 6 MAT 101 sections using Software 2
  (2 instructors)

- 3 MAT 102 sections using Software 2
  (2 instructors)
Controlled Factors

• All sections:
  • Course outline and content
  • Paper and pencil testing in class
  • Departmental tests
  • Common final exam
  • Percentage of final exam grade to overall grade—30%

• Passing criteria—70% and above

• Pilot sections:
  • Required online homework/quizzes
  • Grading rubric
  • No extra credit
Pilots & Results
# Fall 2010 Pilot Results: Success Rate (including withdrawals)

<table>
<thead>
<tr>
<th>Course</th>
<th>Non-Pilot</th>
<th>Pilot 1</th>
<th>Pilot 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 101</td>
<td>45.4%</td>
<td>43.6%</td>
<td>48.5%</td>
</tr>
<tr>
<td>MAT 102</td>
<td>44.9%</td>
<td></td>
<td>50.6%</td>
</tr>
</tbody>
</table>
## Fall 2010 Pilot Results: Comparison of Pilot Course Success Rates by instructor (including withdrawals)

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Past success rate average (2005 FALL-2010 SUMMER)</th>
<th>Pilot success rate average (2010 FALL)</th>
<th>Change in success rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor 1</td>
<td>43.6%</td>
<td>49.0% using 1</td>
<td>+ 5.4%</td>
</tr>
<tr>
<td>Instructor 2</td>
<td>54.0%</td>
<td>39.0% using 1</td>
<td>- 15.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>49.9%</strong></td>
<td><strong>43.6%</strong></td>
<td><strong>- 6.3%</strong></td>
</tr>
<tr>
<td>Instructor 3</td>
<td>33.7%</td>
<td>48.5% using 2</td>
<td>+ 14.8%</td>
</tr>
<tr>
<td>Instructor 4 (102)</td>
<td>28.3%</td>
<td>46.4% using 2</td>
<td>+ 18.1%</td>
</tr>
<tr>
<td>Instructor 5 (102)</td>
<td>40.6%</td>
<td>52.9% using 2</td>
<td>+ 12.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35.1%</strong></td>
<td><strong>49.4%</strong></td>
<td><strong>+ 14.3%</strong></td>
</tr>
</tbody>
</table>
## My MAT 102 Final Exam Average Grade History

<table>
<thead>
<tr>
<th></th>
<th>Headcount</th>
<th>Mean Score</th>
<th>StdDev Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009 Spring</strong></td>
<td>70</td>
<td>53.7</td>
<td>18.2</td>
</tr>
<tr>
<td><strong>2009 Fall</strong></td>
<td>42</td>
<td>61.3</td>
<td>16.9</td>
</tr>
<tr>
<td><strong>2010 Spring</strong></td>
<td>29</td>
<td>52.5</td>
<td>17.3</td>
</tr>
<tr>
<td><strong>2010 Fall</strong></td>
<td>31</td>
<td>69.6</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>172</td>
<td>58.2</td>
<td>18.5</td>
</tr>
</tbody>
</table>
## Fall 2010 MAT 102 Final Exam: All Full Time Instructors

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Headcount</th>
<th>Mean Score</th>
<th>StdDev Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>55.9</td>
<td>19.5</td>
</tr>
<tr>
<td>2</td>
<td>15</td>
<td>45.9</td>
<td>24.3</td>
</tr>
<tr>
<td>3</td>
<td>27</td>
<td>62.4</td>
<td>17.1</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>45.1</td>
<td>24.8</td>
</tr>
<tr>
<td>5</td>
<td>16</td>
<td>73.5</td>
<td>15.9</td>
</tr>
<tr>
<td>6</td>
<td>31</td>
<td>69.6</td>
<td>16.8</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
<td>58.3</td>
<td>19.8</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>65.4</td>
<td>19.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>190</strong></td>
<td><strong>60.4</strong></td>
<td><strong>22.0</strong></td>
</tr>
</tbody>
</table>
Rationale

- Sound learning requirements
  - Simple and easy to navigate
  - Mastery based
  - Limitless number of problems
  - Intelligent help tools
- Easily adaptable to lecture, lab, modular, emporium...
- Great customer support
- Cost effective to the student

Decision

- Adopting a new software and textbook—one for all levels
- Requiring online homework with due dates—by the start of the following class period
### Decisions & Implementation

- **Fall 2011 –**
  - MAT 031/032/101
    - New textbook
    - **MAT 101: online homework required**
    - MAT 031/032: online homework optional
  - MAT 102: old textbook and software

- **Spring 2012 –**
  - MAT 031/032/101 continue as above.
  - **MAT 102 classes:**
    - New textbook
    - Online homework required

- **Fall 2012 –**
  - **MAT 031/032 classes:** online homework required
Implementation: Planning and Communication are keys to success
Implementation Strategies

- **Facilities Set Up**
  Installation of software across campus
  ◦ Labs, classrooms, offices

- **Organization**
  ◦ Curriculum Coordinator
  ◦ Course Lead
  ◦ Course Team
Implementation Strategies

- **Course Set Up**
  - Policies, Assessments & Rubrics
  - Syllabi & Course Outlines
  - Software Curriculum & Templates
  - Lessons

- **Master Course Shell (Bb)**
  - Directions to Students and Instructors
  - Policies
  - Syllabi & Course Outlines
  - Lessons
  - Resources
  - Gradebook
Implementation Strategies

- **Training for/Communication with:**
  - Instructors – Orientation/Training; Math Fairs; matching with curriculum coach (mentors); email communications, FAQs & training video links
  - Students – in class & via video
  - Math Tutors
Difficult process
Difficult process

Major cultural change
Difficult process

Major cultural change

MAT 102 success rate reached 49% for the first time--Spring 2012.
Current Focus and Efforts

- Curriculum Mapping
- Data Collection
- Learning Activities
- Path Options
Fast Track classes appear to be more successful than Full Term classes. On average, there is 3 to 8 percentage-point difference in student success especially at the 031 and 032 levels.

(Note: Graphs below reference Fall & Spring data only (summers excluded) for Full & Fast Track classes, SP 2004 - SP 2011)
A higher letter grade (A or B) is a better predictor of success (C or above) in the subsequent math course.

(Note: Graphs below reference data for Full & Fast Track classes, SP 2004 - SP 2011)

- There seems to be a significant gap in success rates between 101 and 102; but the largest gap occurs between 032 and 101

Curricular changes undertaken with the redesign are expected to address these problematic gaps.
New Student

Placement Test

Are you satisfied with your placement score?

Yes

Choose course option.

No

Would you like to take a Placement Refresher?

Yes

Placement Refresher

No

Choose course option.

Full Term Section

Late Start Section

Fast Track Section

Online Section

Independent Section

Exemption Section
Lessons to Remember

Kathy Almy

1. One size does not fit all.
2. Small changes in a few sections produce small results. (Mandatory changes)
3. One large change will **not** be enough to produce a large effect. (Comprehensive)
4. Learn from mistakes of others. (Research)
5. Assessment and data are necessary throughout the process.
6. Provide support, training, and communication often and in multiple ways.
7. HOW is as important as WHAT.
8. Commitment matters more than funding.
9. Work with what you’ve got. (People and resources)