Designing for Student Success in Times of Uncertainty: Adaptive / Active Learning

Peter van Leusen, Ph.D.
ASU Charter

ASU is a comprehensive public research university, measured not by whom it excludes, but by whom it includes and how they succeed; advancing research and discovery of public value; and assuming fundamental responsibility for the economic, social, cultural and overall health of the communities it serves.
Who needs help?

What do they need help with?

What’s the best way to help?
Goal

90% Retention

- Do active learning in every class
- Help 90% of students get C or better
- Reduce withdrawal rate to under 5%
- Identify struggling students by week 2
Introduction to Biology (~850 non-majors)
Same instructor, curriculum, and assessment

<table>
<thead>
<tr>
<th></th>
<th>Spring 2014 (lecture)</th>
<th>Fall 2014 (lecture)</th>
<th>Spring 2015 (active)</th>
<th>Fall 2015 (active + adaptive)</th>
<th>Spring 2016 (active + adaptive)</th>
<th>Fall 2016 (active + adaptive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Withdrawal Rate</td>
<td>11</td>
<td>10</td>
<td>20</td>
<td>1.5</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Grade of C or Better</td>
<td>77</td>
<td>80</td>
<td>72</td>
<td>94</td>
<td>91</td>
<td>91</td>
</tr>
</tbody>
</table>
Adaptive / Active Learning

Outcomes

College Algebra (~2500 enrollment)
Same instructor, curriculum, and assessment

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>All Students</th>
<th>Math Placement below Algebra</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 - 2015</td>
<td>55.0</td>
<td>40.6</td>
</tr>
<tr>
<td>2015 - 2016</td>
<td>58.7</td>
<td>45.7</td>
</tr>
<tr>
<td>2016 - 2017</td>
<td>79.2</td>
<td>74.4</td>
</tr>
</tbody>
</table>
Implementation

Adaptive / Active Learning

Adaptive Learning Before Class

- Remember
- Understand
- Apply
- Analyze
- Evaluate
- Create

Active Learning in Class / LMS

1. Acquire Info
   - Read textbook, watch video, simulation, etc.

2. Assess
   - Do practice problems, take quiz before class

3. Apply
   - Solve an applied problem (case study) with classmates

4. Assimilate
   - Write essay, solve problems, take quiz, etc.

Bloom's Taxonomy

Adaptive System

- Prepare
- Prove
- Participate
The goal of adaptive courseware is to provide the right lesson to the right student at the right time.
What is adapting to the learner?

- Lesson sequence
- Content selection

What is guiding the adaptivity?

- Assessment – rapid remediation
- Association – lesson relationships
- Agency – student chooses
- Algorithm (analytics) – recommendations
Active Learning

• constructs knowledge
• fosters higher order thinking
• includes metacognition

(Brame, 2016)
Example: Course Development

Adaptive / Active is a team sport!
Benefits

Student benefits of adaptive / active learning

Respects their prior knowledge
Responds to their learning needs
Reduces gaps in their understanding

Faculty benefits of adaptive / active learning

Monitors which students need assistance
Measures curriculum performance
Maximizes course outcomes
The BioSpine Initiative

The BioSpine is a project in the School of Life Sciences (SOLS) to develop, implement, and evaluate an integrated undergraduate curriculum in the biological science. This project leverages adaptive courseware for engaging students in frequent formative activities and assessments. Instructors use evidence-based methods of teaching to engage students in real-world scenarios and problem-solving, helping students apply biological models in a collaborative setting.
Thank you.

Peter van Leusen, Ph.D.
Peter.van.Leusen@asu.edu
References

