Integrating Adaptive Courseware with High-Impact Practices to Promote Student Success at CSU

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Cats in boxes are *the best*!

A. True

B. False
CSU has a goal to achieve a 6-year graduation rate equal to:

A. 60%
B. 70%
C. 80%
D. 90%
Commitment to Student Success

- Six-year graduation rate goal: 80% for Fall 2020 cohort
- Eliminate the 7-10 point gap between subgroups
Fall 2018 Undergraduate Demographics

~ 27.2% racially/ethnically diverse
~ 20.4% Pell recipients (prelim. est.)
~ 22% first-generation college students
Supporting academic success: Three crucial types of learning

- **Robust Learning**
  - Long-term recall
  - Transfer knowledge across contexts
  - Accelerated future learning

- **Integrative Learning**
  - Make connections across courses, disciplines, contexts
  - Apply knowledge in co-curricular and non-academic contexts

- **Self-Regulated Learning**
  - Understand and use effective study approaches
  - Manage choices and life circumstances to support learning
Where does **robust** learning appear in Bloom’s Taxonomy?

A. Top Rows
B. Middle Rows
C. Bottom rows
Learning Types and Bloom’s Taxonomy

- **Self-Regulated Learning**
  - **Remembering**: Recalling relevant knowledge from long term memory
  - **Understanding**: Making sense of the material you have learned
  - **Applying**: Use the knowledge gained in new ways
  - **Analyzing**: Breaking the concept into parts and understand how each part is related to one another
  - **Evaluating**: Making judgements based on a set of guidelines
  - **Creating**: Putting information together in an innovative way

- **Robust Learning**
  - **Self-Regulated Learning**
  - **Integrative Learning**
What is Adaptive Learning Courseware?
Technology that requires students to master the same learning objectives:

- Order and timing of content is determined by the courseware
- Tends to be graded based on completion
- Usually self-paced
- Can include tools for metacognition
- Questions vary across Bloom’s, typical emphasis is on lower levels
<table>
<thead>
<tr>
<th>HIPs Activity Categories</th>
<th>HIPs Activity Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate research</td>
<td>Fosters cultural competency and global perspectives</td>
</tr>
<tr>
<td>Service-learning or community-based learning</td>
<td>Engages students in collaborative projects</td>
</tr>
<tr>
<td>Internships</td>
<td>Strengthens intellectual and practical skills</td>
</tr>
<tr>
<td>First-year seminars</td>
<td>Deepens personal and social responsibility</td>
</tr>
<tr>
<td>Learning communities</td>
<td>Provides for integrative and applied learning</td>
</tr>
<tr>
<td>Study abroad</td>
<td>Provides frequent constructive feedback</td>
</tr>
<tr>
<td>Capstone courses</td>
<td>Develops metacognitive thinking</td>
</tr>
</tbody>
</table>

High-Impact Practices (HIPs)

Educational Practices that Improve Academic Achievement
Adaptive Courseware + HIPs: Supporting Three Learning Types and Bloom's Categories

- **Integrative Learning HIPs**
- **Self-Regulated Learning HIPs and ADAPTIVE**
- **Robust Learning ADAPTIVE**

- **CREATING**
  - Putting information together in an innovative way
- **EVALUATING**
  - Making judgements based on a set of guidelines
- **ANALYZING**
  - Breaking the concept into parts and understand how each part is related to one another
- **APPLYING**
  - Use the knowledge gained in new ways
- **UNDERSTANDING**
  - Making sense of the material you have learned
- **REMEMBERING**
  - Recalling relevant knowledge from long term memory
## HIPs Activity Characteristics

- Fosters cultural competency and global perspectives
- Engages students in collaborative projects
- Strengthens intellectual and practical skills
- Deepens personal and social responsibility
- Provides for integrative and applied learning
- Provides frequent constructive feedback
- Develops metacognitive thinking

Adaptive Courseware + HIPs

Fostering robust, integrative, and self-regulated learning
Association of Public & Land-Grant Universities
Personalized Learning Consortium

Accelerating Adoption of Adaptive Courseware Program
Program Goals

• Deliver high-quality education to a larger, more diverse student body
• Monitor and improve students’ academic performance to increase graduation rates
• Decrease costs

Implementation Approach: Institution-Wide Commitment

• Scale: 15-20% of general education enrollments across many disciplines
• Courseware assignments: integral, at regular intervals
• Support: faculty professional development; technical assistance
APLU Criteria:
Adaptive Platforms

• Strong disciplinary content
• Effective performance tracking
• Tools to help students develop self-regulated learning
Can you guess how many adaptive courseware platforms were approved to be included in the program?

A. 3
B. 5
C. 8
D. 12
E. 21
APLU-Approved Adaptive Courseware Platforms

1. Acrobatiq
2. Cerego (Macroeconomics and Stats)
3. Cengage Learning Mindtap
4. CogBooks
5. Fishtree
6. Fulcrum Labs
7. Knewton
8. LeAP by D2L
9. Difference Engine by Learning Objects (Cengage)
10. LoudCloud
11. Lumen Waymaker
12. McGraw-Hill Education ALEKS
13. McGraw-Hill Education LearnSmart
14. Macmillan Learning Curves
15. Open Learning Initiative at Carnegie Mellon University
16. Open Learning Initiative at Stanford University
17. OpenStax Tutor
18. Pearson MyLab & Mastering (with Knewton)
19. Realizeit
20. Smart Sparrow
21. WileyPlus with ORION (Snapwiz)
## Platforms Used at Colorado State

<table>
<thead>
<tr>
<th>Platform</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>CogBooks</td>
<td>• History</td>
</tr>
<tr>
<td>Inquizitive</td>
<td>• History</td>
</tr>
<tr>
<td>McGraw-Hill LearnSmart</td>
<td>• Accounting</td>
</tr>
<tr>
<td></td>
<td>• Biology</td>
</tr>
<tr>
<td></td>
<td>• Economics</td>
</tr>
<tr>
<td></td>
<td>• Philosophy</td>
</tr>
<tr>
<td>Macmillan Learning Curve</td>
<td>• Astronomy</td>
</tr>
<tr>
<td></td>
<td>• Psychology</td>
</tr>
<tr>
<td>Pearson MyLab</td>
<td>• Mechanical Engineering</td>
</tr>
<tr>
<td></td>
<td>• Physics</td>
</tr>
<tr>
<td>Wiley-Orion</td>
<td>• Accounting</td>
</tr>
</tbody>
</table>
Program Criteria: Target Courses

- General education
- Gateway courses within a discipline area
- High-enrollment
- High D/F/W rate
- High number of Pell-eligible students
Program Participants

- Arizona State University
- Colorado State University
- Georgia State University
- Northern Arizona University
- Oregon State University
- Portland State University
- University of Louisville
- University of Mississippi
Holistic, Aligned Approach

Support Course Redesign
- Backward design
- Robust, integrative, and self-regulated learning
- High Impact Practices
- Assessment techniques for large classes

Integrate Related Innovations
- Learning Assistants
- Department-specific assessments
- Other institutional priorities

Provide Professional Development
- Faculty collaboration groups
- Individual or group consultations
- Ongoing communities of practice
- Classroom observations & feedback
- Campus-wide presentations
- External experts: keynotes, workshops

Provide Technical Support
- Courseware selection
- Courseware integration into LMS
- Troubleshooting problems
- Intervention Strategies

Backward design
Robust, integrative, and self-regulated learning
High Impact Practices
Assessment techniques for large classes
Learning Assistants
Department-specific assessments
Other institutional priorities
Faculty collaboration groups
Individual or group consultations
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Courseware selection
Courseware integration into LMS
Troubleshooting problems
Intervention Strategies
At CSU, which department does not integrate adaptive courseware into at least one course?

A. Accounting
B. Physics
C. Spanish
D. Mechanical Engineering
E. Biology
### Implementation Progress to Date

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 faculty</td>
<td>29 faculty</td>
<td>FALL 2018: 42 faculty</td>
</tr>
<tr>
<td>51 sections</td>
<td>82 sections</td>
<td>71 sections</td>
</tr>
<tr>
<td>3,124 enrollments</td>
<td>8,212 enrollments</td>
<td>8,581 enrollments</td>
</tr>
</tbody>
</table>

- **First Year French I**
- **First Year French II**
- **First Year German I**
- **First Year German II**
- **First Year Spanish I**
- **First Year Spanish II**
- **General Physics I**
- **General Physics II**
- **Principles of Microeconomics**

- **First Year French I**
- **First Year French II**
- **First Year German I**
- **First Year German II**
- **First Year Spanish I**
- **First Year Spanish II**
- **General Physics I**
- **General Physics II**
- **Principles of Microeconomics**

- **First Year French I**
- **First Year French II**
- **First Year German I**
- **First Year German II**
- **First Year Spanish I**
- **First Year Spanish II**
- **General Physics I**
- **General Physics II**
- **Principles of Microeconomics**

- **Appreciation of Philosophy**
- **Attributes of Living Systems**
- **Fundamentals of Accounting**
- **Introduction to Astronomy**
- **General Psychology**
- **Introduction to Mechanical Engineering**
- **Humans and Other Animals**
- **Principles of Human Biology**
- **Principles of Macroeconomics**

- **Biology of Organisms- Animals & Plants**
- **General Chemistry I**
- **General Chemistry II**
- **Health and Wellness**
- **Mechanical Engineering Problem Solving**
- **Media in Society**
- **Survey of Human Nutrition**
- **US History to 1876**
- **US History Since 1876**

**Goal 12,300-16,300 enrollments**

**Anticipate 14,000+ enrollments in Year 3**
Sample Courses: Adaptive & HIPs

- General Physics I & II (PH 121/122)
- Attributes of Living Systems (LIFE 102)
- General Chemistry I (CHEM 111)
Course Characteristics

- High enrollment (2000+ per year)
- Foundational and Gateway
- Large lecture, many sections and instructors
- Lecture-recitation format
Course Challenges

Challenge 1: The course is taught by relatively new graduate instructors (non-tenure track (NTT) faculty) who may only teach the course once.

Challenge 2: Large-lecture format is not conducive to active learning.

Challenge 3: This foundational and gateway course is important to students' curriculum trajectory.
Redesign Features

- Course Content Coordination
- Incorporation of Adaptive Learning Assignments
- Integration of Active Learning
- Development of a Strong Teaching Team
- Consistent within-week Course Content
- Alignment with Text
- Integration of Learning Assistants (LAs)
Outcomes

Outcome 1: Improved Teaching

Outcome 2: Level Playing Field

Outcome 3: Students who complete adaptive demonstrated increased mastery over similar content on exams

Outcome 4: Consistent Course Grade Outcomes
CLICKER QUESTION

Has the integration of HIPs and adaptive courseware been easy?

A. Yes
B. No
C. It depends
## Implementation challenges

<table>
<thead>
<tr>
<th>Adaptive Platforms: Technical Challenges</th>
<th>High-Impact Practices</th>
<th>Initiation &amp; Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platform Features (interface, compatibility)</td>
<td>Classroom Space Impedes Active Learning</td>
<td>Departmental Structure</td>
</tr>
<tr>
<td>Technology Use &amp; Integration</td>
<td>Learning Assistants (LAs): Institutional Commitments</td>
<td>Key Values: Harmonizing Departmental &amp; Instructor Autonomy with Efforts to Standardize Use of Best Practices</td>
</tr>
<tr>
<td>Challenges of Multiple Platforms</td>
<td>Significant Faculty Investment</td>
<td>Reward System: Perceived Innovation Risk</td>
</tr>
</tbody>
</table>
Overcoming the Implementation Challenges

- Highlight faculty champions; showcase successes
- Leverage department-specific desired outcomes
- Formalize the process (MOUs), while adapting to departmental cultures, priorities, and values
- Maintain regular contact; adapt to changing circumstances
- **Align multiple innovations** (e.g., HIPs, LAs, Early Performance Feedback, support for revised assessments)
## Initial Results

### Economics – Adaptive + Active + Learning Assistants in 1 section

<table>
<thead>
<tr>
<th>Semester</th>
<th>ECON 202 FALL</th>
<th>ECON 202 SPRING</th>
<th>ECON 204 FALL</th>
<th>ECON 204 SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFW Rate Change</td>
<td>+ 2%</td>
<td>-1.5%</td>
<td>+3%</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>31 students</td>
<td>11 students</td>
<td>0%</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>ECON 204 FALL</th>
<th>ECON 204 SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFW Rate Change</td>
<td>-12%</td>
<td>-2%</td>
</tr>
<tr>
<td></td>
<td>71 students</td>
<td>13 students</td>
</tr>
</tbody>
</table>

### LIFE – Adaptive + Active + Learning Assistants in 1 section

<table>
<thead>
<tr>
<th>Semester</th>
<th>LIFE 102 FALL</th>
<th>LIFE 102 SPRING</th>
<th>LIFE 103 FALL</th>
<th>LIFE 103 SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFW Rate Change</td>
<td>NA</td>
<td>-2%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>33 students</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>LIFE 103 FALL</th>
<th>LIFE 103 SPRING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFW Rate Change</td>
<td>-3%</td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td>6 students</td>
<td>NA</td>
</tr>
</tbody>
</table>

Initial data in four distinct courses - each with multiple sections - indicates decreased DFW rates in most cases.
Initial Results

Physics – Adaptive + Active + Learning Assistants

• Spring 2017 sessions had consistently better attendance than in Spring 2016.
• Homework completion was higher, even though the total points allocated for homework were reduced.
• Students demonstrated improved reasoning and stronger explanations.
• Increased overall challenge level of homework and test questions - without increasing the DFW rate.

Chemistry – Adaptive + Active

• Students scored higher on the first exam than in prior semesters.
• Instructors reported increased enjoyment of teaching.

Textbook Savings

• Saving vary by platform; typically 15 – 25% for platforms covered by Unizin contract, e.g., History text costs $35
Preliminary Assessment Implications

- Combine course-level metrics with more fine-grained, department-specific indicators
- Measure a range of potential impacts, e.g., rigor, concept mastery, consistency across sections, etc.
- Highlight local research persuasive to faculty and departmental administrators
- Standardize instructional practices and grading across sections to promote better opportunities and fairer outcomes for students; Consider implications for desired cultural changes
- Allow three years for faculty to achieve expert use
- Participate in regional and national networks like APLU to learn from and share with other institutions
Thank you