Blended Learning in Liberal Arts College Courses

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Bryn Mawr College May 2012

Sponsored by a grant from
Part of the NGLC Initiative

- $250,000 grants to colleges in Wave I
- 600 applications, 29 projects funded
NGLC Project Components

- Innovation
- Collaboration
- Evidence of Impact

Blended approach in a liberal arts setting

Can we improve student learning outcomes, particularly in gateway STEM courses?

Knowledge-sharing among 39 partner institutions
What is “Blended”?

● Our working definition
  ● Students receive feedback on learning outside classroom through computer-based materials
  ● This extra-classroom learning alters how instructor teaches or uses class time

● No prescriptions beyond this
Courses Taught at Bryn Mawr

Preparatory
QUAN001 Quantitative Seminar
CHEM101 Focus on Fundamentals

Introductory Level
BIOL101-102 Intro to Biology (post-bacs)
BIOL111-113 Biology Exploration II-IV (UG)
CHEM103 General Chemistry I
CMSC110 Intro to Computer Science
(in development for fall 2012)
HART106 Art of the Global Middle Ages

Intermediate/Advanced
GEOL202 Mineralogy/Crystal Chemistry
PSYC205 Research Methods and Statistics
ECON242 Economics of Local Environmental Programs
CITY328 Geographic Information Systems
CMSC/LING325 Computational Linguistics
Courses at Partner Institutions

<table>
<thead>
<tr>
<th>Institution</th>
<th>Course</th>
<th>Instructor</th>
<th>Term</th>
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<tbody>
<tr>
<td>Trinity College</td>
<td>PBPL 812-01 Women and Politics</td>
<td>Stefanie Chambers</td>
<td>Summer 2012</td>
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<tr>
<td>Wesleyan University</td>
<td>SCIE612 Biology, Neuroscience and Behavior</td>
<td>Janice Naegele</td>
<td>Summer 2012</td>
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<tr>
<td>Smith College</td>
<td>MTH247 Regression Analysis</td>
<td>Nicholas Horton</td>
<td>Fall 2012</td>
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<tr>
<td>Colorado College</td>
<td>Physics 220 The Physics and Meaning of Flight</td>
<td>Randy Stiles</td>
<td>Fall 2012</td>
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<td>Haverford College</td>
<td>MATH203 Statistical Methods and Their Applications (lab)</td>
<td>Lynne Butler</td>
<td>Fall 2012</td>
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<tr>
<td>Union College</td>
<td>HST256 Modern European Ideas</td>
<td>Mark Walker</td>
<td>Fall 2012</td>
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<tr>
<td>Connecticut College</td>
<td>Graphics and Virtual Environments</td>
<td>Bridget Baird</td>
<td>Fall 2012</td>
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<tr>
<td>Vassar College</td>
<td>Math 141-51/52 Introduction to Statistics</td>
<td>Ming An</td>
<td>Spring 2013</td>
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Join us! [See our website](#) for more information on how you can apply for a stipend to support course development.
What We’ve Learned So Far

- When surveyed, all fall faculty indicated they would continue blended approach
- Over 75% of students reported computer based components were very helpful or somewhat helpful

WHY?
Why Take a Blended Approach?

INSTANT ASSESSMENT AND FEEDBACK
Instant Assessment/Feedback

- Faculty can assess sooner and more often
- Frequent assessment ...

Name the mineral: silimanite

Note: Case does not matter, but spelling does!

Consciously or unconsciously, we identify minerals using a few key characteristics that we associate with them. Name the two or three characteristics of this mineral that allowed you to name it:
Improves Retention

- “Testing effect” -- assessment improves retention by stimulating recall
- Periodic re-assessment intensifies the effect


Empowers Students

● Students find out immediately whether they have understood something

● They use that knowledge
  ● To better structure study time
  ● To seek help on things they don’t understand
  ● To ask better, more directed questions
Empowers Faculty

- Generates “learning data”
- Real-time look at how students are doing
- Supports “agile” teaching
- Supports coaching
VISUAL PRESENTATION OF
INFORMATION
Visual Presentation of Information

- Students preferred video over text explanations
  - If not too long (< 20 minutes)
  - Not necessarily in place of classroom explanation
  - Not necessarily video of a person talking

- Key was visual presentation of information – animations, simulations, diagrams:
  - Mistakes in Meiosis
Multimedia Research Confirms

- Controlled experimental research
  - Strong evidence that people learn better when visuals are combined with words – *in any medium*
  - Little evidence that seeing face of narrator matters

BEST PRACTICES
Materials Design

- Worst were “boring” or “repetitive” – meaning …
  - Focused only on low-level learning
  - Feedback limited to “right” or “wrong”
  - Did not allow students to retry and progress

- Students did suggest faculty could make up for some feedback limitations by going over solutions in class
Materials Design

- Best materials
  - Require *application* of concepts or skills
  - Explain *why* answers are right or wrong
  - Allow students to try again and learn from mistakes
  - Offer “scaffolding” (e.g., hints) to guide students toward an answer so retry isn’t fruitless

- Example: [Moodle pre-lab tutorial](#)
Student Cost: Benefit Analysis

- Costs are things that waste time
  - slow load times
  - confusing interface
  - difficulty entering answers correctly

- If substantial, can outweigh benefits of instant feedback and visual information
Integration Best Practices

● Emphasize mastery
  ● Use “low stakes” assessments: “I like that I can make mistakes and get feedback before it counts …”
  ● Allow students to practice as needed

● Make connection to learning goals or outcomes of course clear

● Respond to student questions or confusions in class
How Students Used Materials

- Preparing for lecture/assignment
- Figuring out things after lecture/assignment
- Additional practice
- Review material for test
- Explore on my own
- Complete assignment
- Other

Courses:
- BIOL101
- BIOL111
- CHEM101
- CHEM103, sec1
- CHEM103, sec2
- ECON242
- GEOL202