The Consequences of Pedagogy and Space: Empirical Research in New Learning Environments

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Learning Spaces Research (LSR): Pilot Phase

• Began in fall 2007, OIT & OCM

• **Methods:** Interviews, surveys of instructors and students using Active Learning Classrooms (ALCs)

• N = 169

*Active Learning Classroom at the U of M (BioSci 64)*
Results:

• Overall positive reactions to the ALCs from students and faculty
• Perceived reduction in psychological distance between instructor and students, among students
• Round tables singled out as particularly important
## LSR: Comparison Studies

### Table 1. Learning Spaces Research: Quasi-Experimental Designs

<table>
<thead>
<tr>
<th>Pedagogical Approach</th>
<th>Room Type</th>
</tr>
</thead>
</table>
|                      | Traditional Classroom | ALC  
| Pedagogical Approach | Lecture            |  
|                      | Active Learning    |

- **PSTL 1131**
- **BIOL 1003**
- **FSOS 3101**

- Fall 2008 - Spring 2011
LSR Comparison Studies: PSTL 1131

- N = 86
- Two sections compared, ALC and traditional
LSR Comparison Studies: PSTL 1131

Traditional Classroom

Active Learning Classroom
LSR Comparison Studies: PSTL 1131

• Quasi-experimental design
  – Controls
    • Time of day
    • Approach to instruction
    • Material covered
    • Assignments/assessments
    • Characteristics of students (age, sex, major, ethnicity, etc.)
  – Treatment
    • Traditional classroom versus ALC
LSR Comparison Studies: PSTL 1131

Student Perceptions, Aggregated Survey Items

- **Enrichment***
  - ALC: 3.15
  - Traditional: 2.83

- **Engagement***
  - ALC: 3.08
  - Traditional: 3.38

- **Flexibility**
  - ALC: 3.25
  - Traditional: 2.73

- **Effective use**
  - ALC: 3.63
  - Traditional: 3.38

- **Course/classroom fit**
  - ALC: 3.56
  - Traditional: 3.02
LSR Comparison Studies: PSTL 1131

Average Composite ACT Scores, by Section

Traditional Classroom: 22.54*
Active Learning Classroom: 20.52*
LSR Comparison Studies: PSTL 1131

Average Course Grades in Total Points, by Section

<table>
<thead>
<tr>
<th></th>
<th>Traditional classroom</th>
<th>Active Learning Classroom (ALC)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected grade*</td>
<td>502.19</td>
<td>454.58</td>
</tr>
<tr>
<td>Actual grade</td>
<td>499.33</td>
<td>484.39</td>
</tr>
</tbody>
</table>

- Expected grade diff p < .05
- Actual grade diff p = .26
LSR Comparison Studies: PSTL 1131

Classroom Activities and Instructor Behaviors

- **Lecture****: 77.4% Traditional Classroom, 54.5% Active Learning Classroom
- **Discussion****: 2.4% Traditional Classroom, 50.4% Active Learning Classroom
- **Podium**: 69.2% Active Learning Classroom
- **Group Activity**: 36.6% Active Learning Classroom
- **Consulting**: 27.4% Traditional Classroom, 54.9% Active Learning Classroom
### LSR: Comparison Studies

#### Table 1. Learning Spaces Research: Quasi-Experimental Designs

<table>
<thead>
<tr>
<th>Pedagogical Approach</th>
<th>Room Type</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traditional Classroom</td>
<td>ALC</td>
</tr>
<tr>
<td>Active Learning</td>
<td>Lecture</td>
<td></td>
</tr>
</tbody>
</table>

- **Fall 2008 - Spring 2011**
LSR Comparison Studies: Biol 1003

- N = 263
- Two sections compared, ALC and traditional, both in STSS
LSR Comparison Studies: Biol 1003

- Quasi-experimental design
  - Controls
    - Approach to instruction
    - Material covered
    - Assignments/assessments
    - Characteristics of students (age, sex, major, ethnicity, etc)
    - Newness of classroom
  - Treatment
    - Traditional classroom versus ALC
LSR Comparison Studies: Biol 1003

Student Perceptions, Aggregated Survey Items

- **Engagement****
- **Enrichment**
- **Flexibility***
- **Effective Use**
- **Course/Room Fit**

<table>
<thead>
<tr>
<th>Feature</th>
<th>ALC</th>
<th>Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engagement****</td>
<td>2.85</td>
<td>3.27</td>
</tr>
<tr>
<td>Enrichment</td>
<td>2.93</td>
<td>3.04</td>
</tr>
<tr>
<td>Flexibility***</td>
<td>3.13</td>
<td>3.41</td>
</tr>
<tr>
<td>Effective Use</td>
<td>3.30</td>
<td>3.63</td>
</tr>
<tr>
<td>Course/Room Fit**</td>
<td>3.52</td>
<td>3.69</td>
</tr>
</tbody>
</table>

Legend: ALC = Active Learning Classroom, Traditional
LSR Comparison Studies: Biol 1003

Average Composite ACT Scores, by Section

- Traditional Classroom: 26.36*
- Active Learning Classroom: 25.32*
## Average Course Grades in Percentage, by Section

<table>
<thead>
<tr>
<th>Section Type</th>
<th>Expected Grade</th>
<th>Actual Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional classroom</td>
<td>78.52</td>
<td>78.45</td>
</tr>
<tr>
<td>Active Learning Classroom (ALC)*</td>
<td>71.77</td>
<td>76.49</td>
</tr>
</tbody>
</table>

- **Actual grade diff p > .05**
**Classroom Activities and Instructor Behaviors**

- **Lecture**
  - ALC: 69.3%
  - Traditional: 74.1%
- **Discussion**
  - ALC: 4.7%
  - Traditional: 2.1%
- **Group Activity**
  - ALC: 32.6%
  - Traditional: 43.2%
- **Q&A**
  - ALC: 35.9%
  - Traditional: 40.4%
- **At Podium**
  - ALC: 82.2%
  - Traditional: 91.1%
- **Not at Podium**
  - ALC: 75.0%
  - Traditional: 89.0%
- **Consulting**
  - ALC: 14.6%
  - Traditional: 26.7%
- **Not Consulting**
  - ALC: 95.8%
  - Traditional: 97.4%
### Table 1. Learning Spaces Research: Quasi-Experimental Designs

<table>
<thead>
<tr>
<th>Pedagogical Approach</th>
<th>Lecture</th>
<th>Active Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Classroom</td>
<td></td>
<td>PSTL 1131</td>
</tr>
<tr>
<td>ALC</td>
<td>FSOS 3101</td>
<td>BIOL 1003</td>
</tr>
</tbody>
</table>

- Fall 2008 - Spring 2011
LSR Comparison Studies: FSoS 3101

- N = 207
- Two sections compared, both in the same ALC
LSR Comparison Studies: FSoS 3101

• Quasi-experimental design
  – Controls
    • Type of learning space
    • Material covered
    • Assignments/assessments*
    • Characteristics of students (age, sex, major, ethnicity, etc)
    • Newness of classroom
  – Treatment
    • Instructional approach, lecture vs student-centered active learning
“The classroom in which I am taking this course…”

Encourages my active participation*

- Active Learning: 2.89
- Lecture: 2.61

LSR Comparison Studies: FSoS 3101
LSR Comparison Studies: FSoS 3101

Average Course Grades in Percentage, by Pedagogical Approach

<table>
<thead>
<tr>
<th>Pedagogical Approach</th>
<th>Expected Grade</th>
<th>Actual Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>81.47</td>
<td>81.80</td>
</tr>
<tr>
<td>Active Learning*****</td>
<td>80.96</td>
<td>85.50</td>
</tr>
</tbody>
</table>

- Expected grade diff p > .05
Average Grades, by Pedagogical Approach

- **All Students***: 85.5% (Active Learning), 81.8% (Lecture)
- **First Quartile****: 71.0% (Active Learning), 77.9% (Lecture)
- **Second Quartile****: 80.1% (Active Learning), 84.4% (Lecture)
- **Third Quartile****: 85.6% (Active Learning), 88.5% (Lecture)
- **Fourth Quartile***: 91.1% (Active Learning), 92.3% (Lecture)

LSR Comparison Studies: FSoS 3101
LSR Comparison Studies: FSoS 3101

Average Grades on Comparable Assignments by Pedagogical Approach

- Participation****: 82.1% (Active Learning) 96.7% (Lecture)
- Financial Planner***: 87.1% (Active Learning) 92.4% (Lecture)
- Case Studies***: 80.4% (Active Learning) 86.8% (Lecture)
- Final Exam****: 77.3% (Active Learning) 90.9% (Lecture)
- Aggregated Assignments****: 82.0% (Active Learning) 91.3% (Lecture)
Controlled studies have shown that new learning spaces:

• Help students to outperform final grade expectations.
• Affect teaching-learning activities, even when the instructor attempts to hold these activities constant.
• Do not conduce to a lecture-based approach; student performance improves when instructors move to active, student-centered teaching methods.
• Are perceived in a largely positive light by students and instructors, but some adjustment is necessary.
Learning Spaces Research: Questions?

- Thanks to our institutional partners, OCM, OIR, OMS, CTL, Ofc of Sr VP and Provost, and thanks to our faculty partners, Drs. Jay Hatch, Sehoya Cotner, and Catherine Solheim.
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http://z.umn.edu/lsr