Active Learning in the Polytechnic Integrated Freshman Year Experience

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Agenda

- Motivation
- Polytechnic Freshman Year Experience
  - Design Thinking
  - Integration of Humanities
  - Active Learning
- Research Informed Reflection
Rationale

- Most people spend 95% of their time interacting with the technologies of the human-made world (National Center for Technological Literacy, 2010).

- “Americans are poorly equipped to recognize, let alone ponder or address, the challenges technology poses or the problems it could solve” (Pearson & Young, 2002, pp.1-2).
Design Thinking

■ Goals
  ▪ Write Problem Statement
  ▪ Apply Ethnographic Methods
  ▪ Develop Information Literacy
  ▪ Document
  ▪ Manage
  ▪ Apply Strategies of Ideation
  ▪ Prototype Solutions

■ 1100 Freshman Students
■ 1 Semester ~ 16 weeks
Active Learning - Motivation

- How People Learn (NAP, 2000)
- STEM Integration in K12 Education (NAP, 2014)
- Changing the Conversation (NAP, 2008)
- Active learning increases student performance in science, engineering, and mathematics (Freeman et al., 2014)
# Active Learning - Integration

<table>
<thead>
<tr>
<th>Meeting times</th>
<th>Courses &amp; Characteristics</th>
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<tbody>
<tr>
<td><strong>10:30am</strong>&lt;br&gt; 50 minutes&lt;br&gt; 2 days/week</td>
<td>Design Thinking in Technology (Tech 120)&lt;br&gt; 40–45 students&lt;br&gt; standard but flexible syllabus</td>
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<tr>
<td><strong>11:30am</strong>&lt;br&gt; 50 minutes&lt;br&gt; 3 or 4 days/week</td>
<td>Introductory Composition (Engl 106)&lt;br&gt; 20 students&lt;br&gt; individual syllabi</td>
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Active Learning – Reflection Year 1

- High (but vague) expectations
- Low Accountability
- New instructors, some with very little advance preparation
- Low “buy-in” from some instructors and some students
- Mixed levels of flexibility
Active Learning – Year 2-3

- 6 integrated (Tech + English + Com) and 6 non-integrated sections (Tech only) for Fall and Spring
- 15 instructors from all 3 programs
- Required pre-semester teaching workshops
- Explicit expectations:
  - Contract commitment and accountability log
  - At least 10 logged instructor meetings
  - At least 3 planned co-teaching days
- $750 stipend for English and Com instructors—1/3 to start, 2/3 after a successful semester
- No shared classroom space or reduced class sizes
Active Learning – Reflection

- Communication – instructors making time to meet, share information, and help negotiate potential differences in terminology/concepts.

- Flexibility – instructors’ willingness to adjust teaching plans and incorporate new strategies along the way.

- Engagement – when instructors took extra steps to make the integration meaningful for their students, including visits to the other instructors’ classrooms and outside activities.
Active Learning – Research

- Student Learning
  - English
  - Communication
  - Design Thinking

- Engagement
  - Attendance Rates
  - Sense of Community
  - Discussion Quality
Active Learning – Student Habits

- Flipped Active Classroom
  - Assumes Students Prepare for Class
  - Anecdotal Evidence to the Contrary

- Traditional Student Habits
  - Class During the Day, Study at Night
  - Read vs. Listen or Both -> Pass Exam
  - Learning = Knowledge of the Right Answer
Active Learning – Class Prep

- Quasi-experimental Research Design
  - Comparison Group: No quizzes (n=200)
  - Treatment Group: Short, low value pre-meeting quizzes (n=260)
  - Spring Semesters, Multiple sections, Multiple instructors, no major course changes

- Data
  - Time Spent on Blackboard
  - Final Course Grades
Active Learning – Results

- Time spent on Blackboard
  - Without Quizzes: 95 hours
  - With Quizzes: 190 hours
  - Significant
Active Learning – Results

- Final Course Grades
  - Without Quizzes: Group Mean 86%
  - With Quizzes: Group Mean 88%
  - Significant

- Final Course Grades (Lower Quartile)
  - Without Quizzes: Group Mean 77%
  - With Quizzes: Group Mean 82%
  - Significant (statistical and practical)
Implications

Integration of Coursework is Complex
  - Expectations and Accountability
  - Flexibility
  - Communication
  - Engagement

Active Learning
  - Potential for Impact
  - Culture Shift for Instructors and Students
  - Expectation Management