Model

- $R^2 = .34$
- $N = 683$
- Measuring Performance on Common Final Exam
- Controls
  - Studio
  - ACS Diagnostic Exam
  - Section
  - Supplemental Workshop
Clusters

- Estimate = 8.9% change in final exam grade per cluster
- \( P < .0001 \)
- Used to reduce model variability
- Clusters equally as effective as raw diagnostic score
Supplemental Instruction

• Estimate = 4.2% of final exam grade

• P = .0039

• Students benefit from supplemental workshops

• Biases
  • Participants are self-selected
  • 75% of participants had low scores on the diagnostic test
Section Effect

- Effect Range = 13.7%
- $P < .0001$
- Sections have a large impact on student performance
Traditional vs. Studio

- Estimate = 4.9% of final exam grade
- P < .0001
- Students perform better in studio courses
- Biases
  - Studio courses are confounded with time

![Graph showing data comparison between Traditional and Studio sections.]
Section/Studio

- Effect Range = 5%
- P = .048
- Some sections have better results with studio classes
- Weak effect which may be explained by variability of students
DFW Comparison

- Very little studio data
- Variability is too high to confirm change in DFW rate
- General downward trend of data
Student Evaluations

- Peer Interaction
- Better Overall
- Instructor Interaction
- Solve Problems
- Enjoyment
- Concept Connections
- Attendance
- Ask Questions
- Motivated
- Rigorous
- More Lecture Time
- Trouble Focusing
- Uncomfortable

Scale:

- Green: Negative
- Gray: Neutral
- Yellow: Positive
Faculty Evaluations

- Space Affects Instruction
- Students Interact More
- Instructor Encourages Group Work
- Enjoy Teaching
- Better for Problem Solving
- Try New Instructional Approaches
- More Interaction
- Better Attendance
- Better Overall for Chemistry
- Better Concept Connection
- Instructor has Heavier Workload
- More Questions
- Better for Underrepresented Groups
- More Academically Rigorous
- Better Student Motivation
- Uncomfortable Students
- More Trouble Focusing
- More Time on Lecture
- Uncomfortable for Instructor

[data chart with bars for negative, neutral, and positive responses]
CLASS Analysis, All

\[(n_{F13} = 519, n_{W14} = 499, n_{S14} = 258)\]
CLASS Analysis, All

<table>
<thead>
<tr>
<th>Category</th>
<th>Overall</th>
<th>Personal Interest</th>
<th>Real World Connection</th>
<th>PS Confidence</th>
<th>PS Sophistication</th>
<th>Conceptual Connections</th>
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Points vs. Quarter & PRE/POST

(n_{F13} = 519, n_{W14} = 499, n_{S14} = 258)
CLASS Analysis, All

(n_{F13} = 519, n_{W14} = 499, n_{S14} = 258)
CLASS Analysis, Sample

Pre/Post Scores vs. PRE/POST

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PRE/POST
CLASS Analysis, Sample

Points vs. Quarter & PRE/POST

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- Overall
- Personal Interest
- Real World Connection
- PS Confidence
- PS Sophistication
- Conceptual Connections

Points vs. Quarter & PRE/POST

- F13
- W14
- S14

Quarter

- F13
- W14
- S14

Points

- 100
- 90
- 80
- 70
- 60
- 50
- 40
- 30
- 20
- 10
- 0

Quarter / PRE/POST
CLASS Analysis, Sample
Attitude vs. Final Exam

Shift Fav Overall vs. Final Exam Grade

\[ Y = -21.88 + 33.98 \times \text{Grade} \]

RMSE: 12.81

\[ R^2: 0.153 \]