Is more activity always better?
A department-wide study of relationships between classroom practices and student performance in biology

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Research Questions & Data Collected

- What variety of teaching practices are currently used in our program?
- What are the relationships between specific classroom practices and student learning?

Goal: identify these relationships to inform teaching practice

Use of class time
Measured via COPUS profiles

Departmental Characterization

- Profiles were created from analysis of COPUS observations.
- Active learning teaching practices are very prevalent in the courses observed.

Characterizing Classrooms using COPUS1-2:

During a classroom visit, student and instructor activity codes are checked off in 2-min intervals. Each classroom can then be characterized:

- Lecture
- Socratic
- Limited Peer Instruction
- Teacher-Centered Peer Instruction

Classroom Practices & Student Learning

- Profiles of classroom types
- Student Performance and Classroom Types

Profile of classroom types

Student Performance and Classroom Types

- Student Performance here is defined as the Percent Normalized Change on the diagnostic test: (postscore-precore) / (1-precore) If post > pre.

Preliminary Conclusions and Next Steps

- We can now quantitatively link program-wide class observational data with student outcomes.
- Still to analyze: term 2 data

What to make of the inconclusive data? e.g.,

Student Performance Positively Correlated with Group Work and Clickers

- As expected*, classes with higher levels student-centered peer instruction result in higher performance.
- There may be a “sweet spot” for the amount of lecturing – need to analyze the rest of the data to see.

Questions for you, with this rich dataset:

Data collected

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<th>Course Level</th>
<th># of Course sections</th>
<th># of Students</th>
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COPUS Profiles:

- Lecture (at the board)
- Lecture (with slides)
- Lecture (at the board)
- Limited PI
- PI (at the board)
- Socratic (at the board)
- Socratic
- Limited Peer Instruction
- Teacher-Centered Peer Instruction
- Teacher-Centered Peer Instruction
- Group work

Example data, representative of each cluster: Figure modified from Lund

In our classes, the most common student-centered activities are:
- Worksheets
- Clicker questions
- Individual problem-solving
- Asking/answering questions (talking to class)

Instructor Feedback to Class

Student Performance (% Normalized Change)

Clicker Questions

Students doing group work

Research:

- How would you approach your analysis?
- What would you look for?
- What questions would you ask?

Teaching:

- How might these results impact your own teaching practices?

Thank you to...

- the many Biology instructors and students for participating in this research.
- Leah MacFadyen & the LAVA group for helpful discussion on COPUS analysis.

References

3 Lund L et al. CBE - Life Sciences Education (2013) 14(2) in press