

Are lab courses worth the effort?

Improving student success and engagement in a biochemistry lab course

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We need to talk about lab courses...

- Lower level (1/200 level)
 - Large enrollment, foundational concepts/skills
 - TA-led
- Upper level (3/400 level)
 - Smaller enrollment, more advanced skills, discipline-specific
 - TA / Instructor led
- “Anna” on the golf course



So the question is...

- Do students learn valuable skills from lab courses?
 - Answer is not as simple as it seems.
- Are the resources required for upper-level lab instruction worth it?

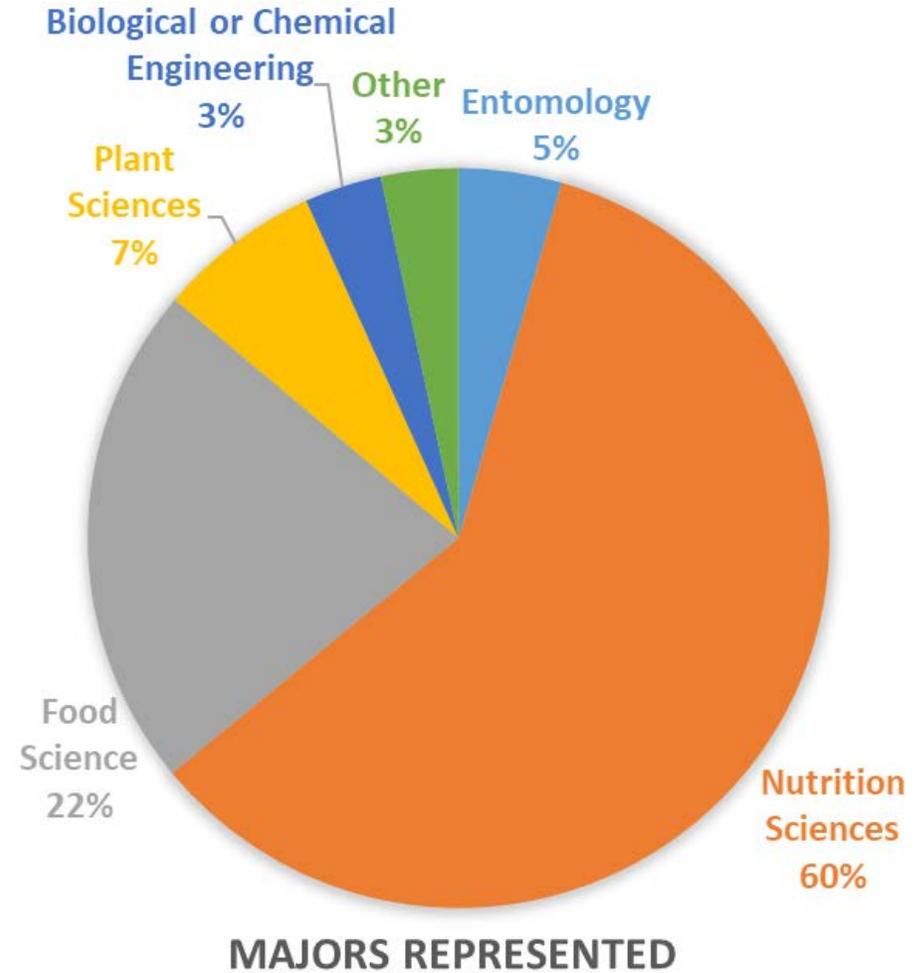
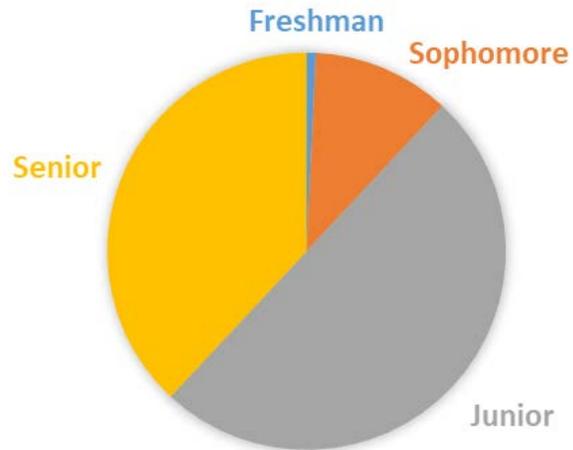


Image credit: hunter.cuny.edu/mls

Biochemistry Lab

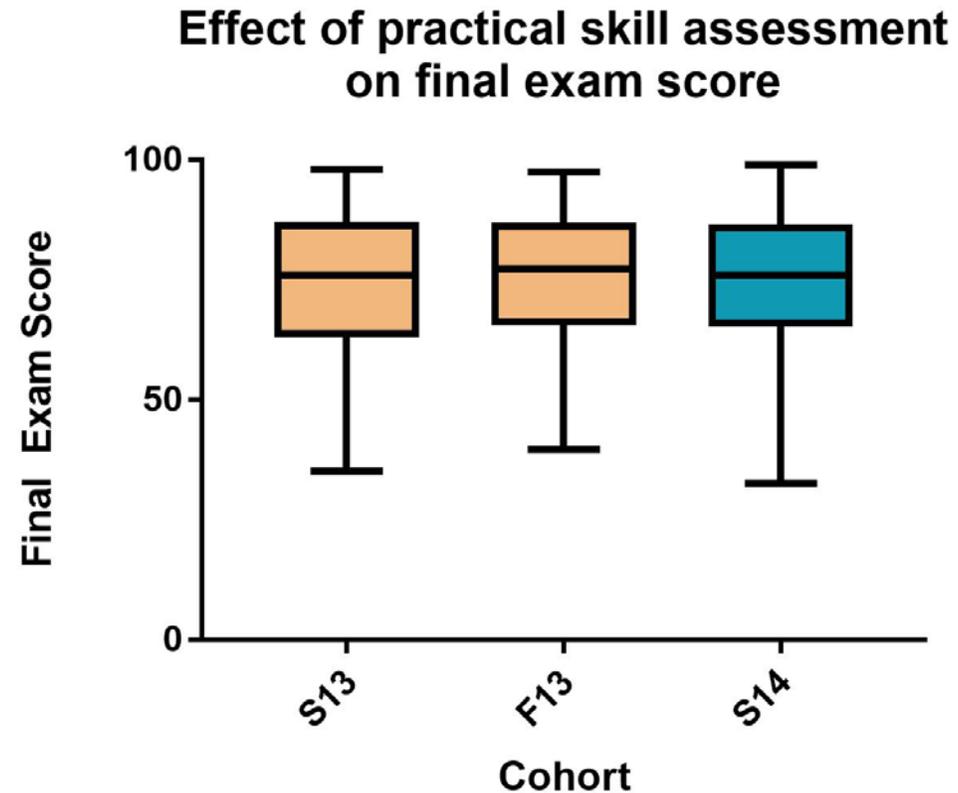
- General biochemistry lab for non-majors.
- 1cr, meets 1/week for 2 hr 50min.

STUDENT MAKEUP

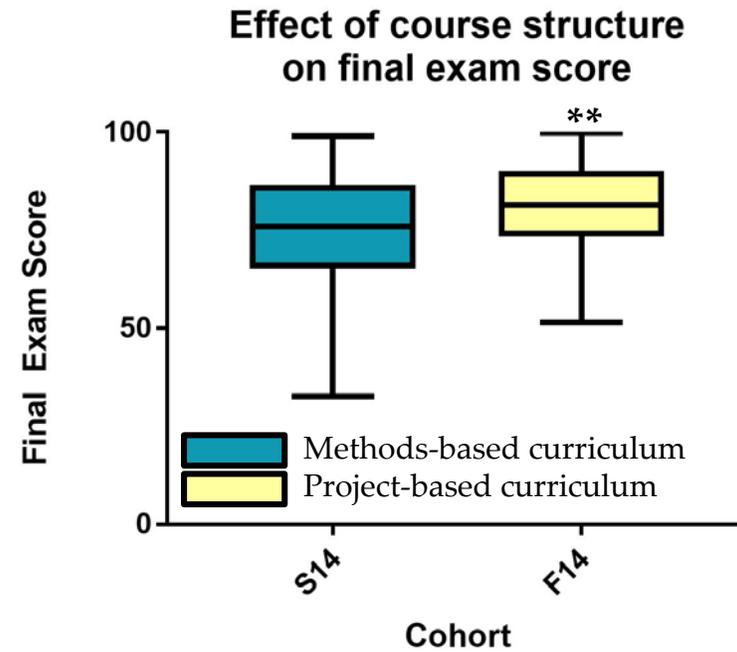
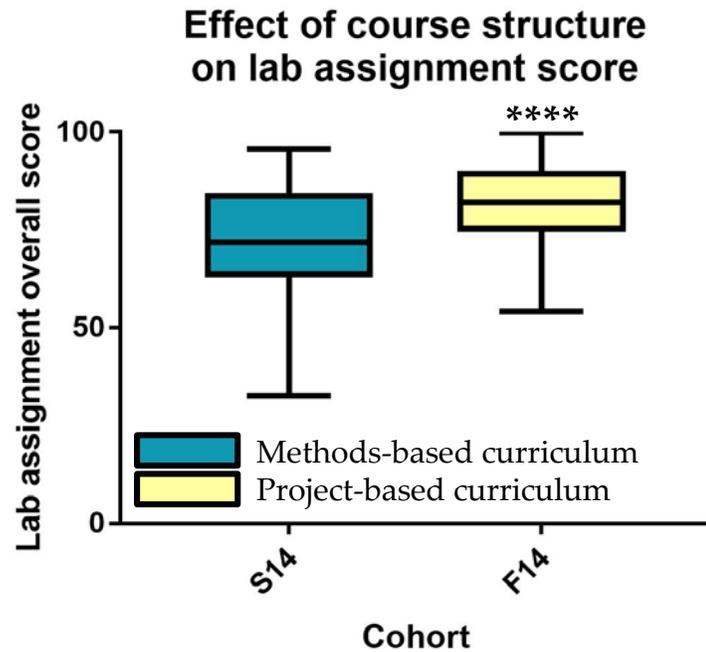


#1: Are we assessing what we actually want them to learn?

- Individual practical assessments are resource-intensive, stressful, take time out of class, and critical.
- Students take 2 practical exams, which take a total 3 weeks of the course.
- Scores on final written exam are not negatively impacted by giving up class periods to practical exams.



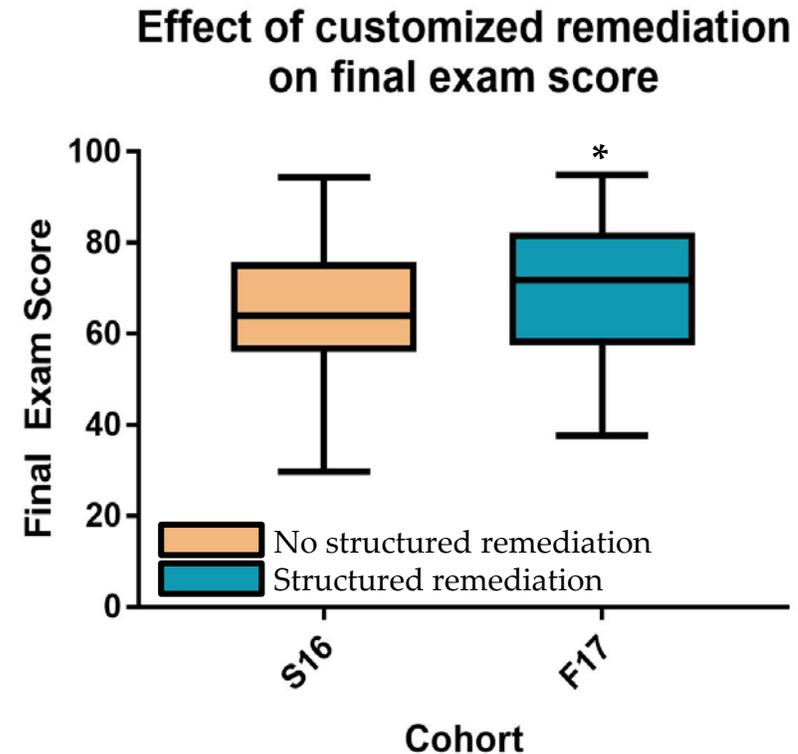
#2: Project-based labs are better than “cookbook” labs



- Changing formats improves outcomes on major assessments, fewer outliers.

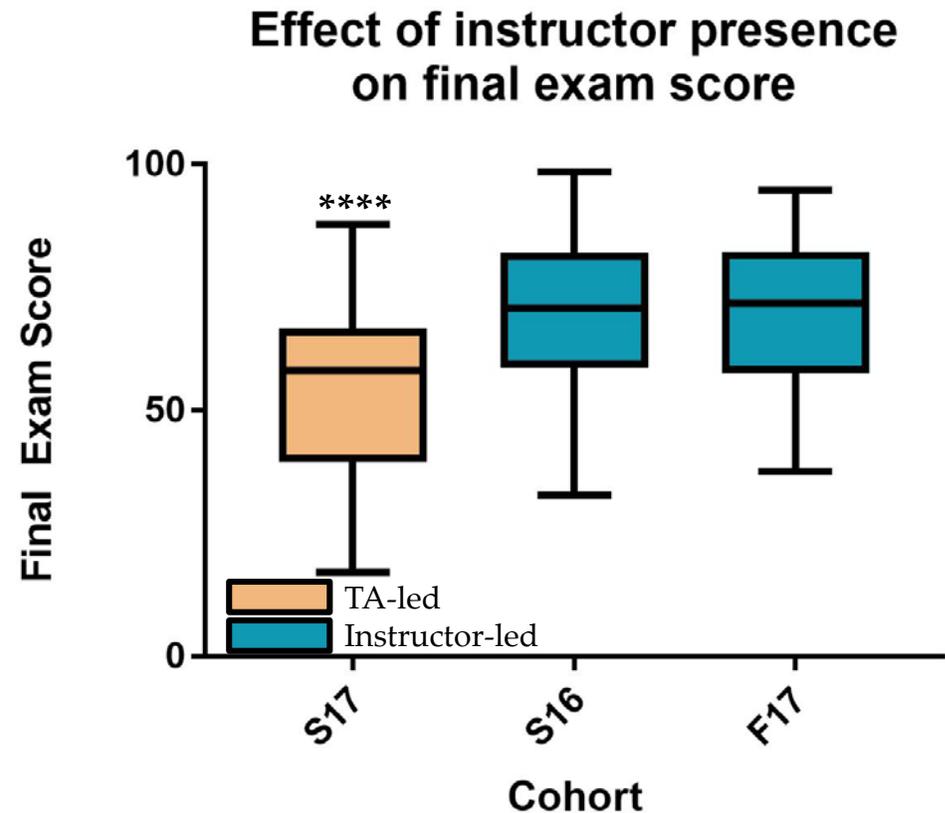
#3: Push students to higher standards; they will rise to the challenge

- Students given very challenging midterm, and afterwards a problem set to remediate points, based on how they did on the midterm.
- They could “earn back” a portion of the points lost.
- Customized remediation efforts tied to midterm performance leads to improved final exam performance.

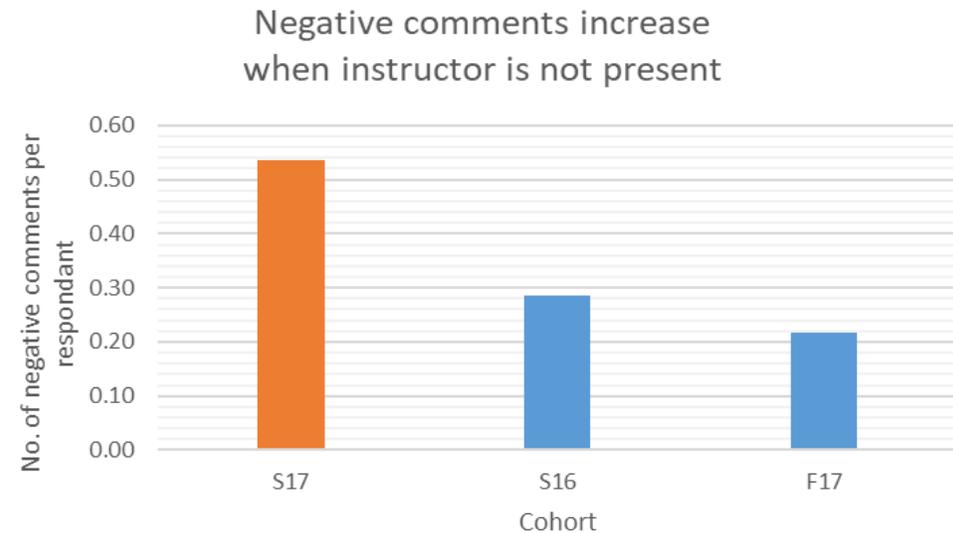
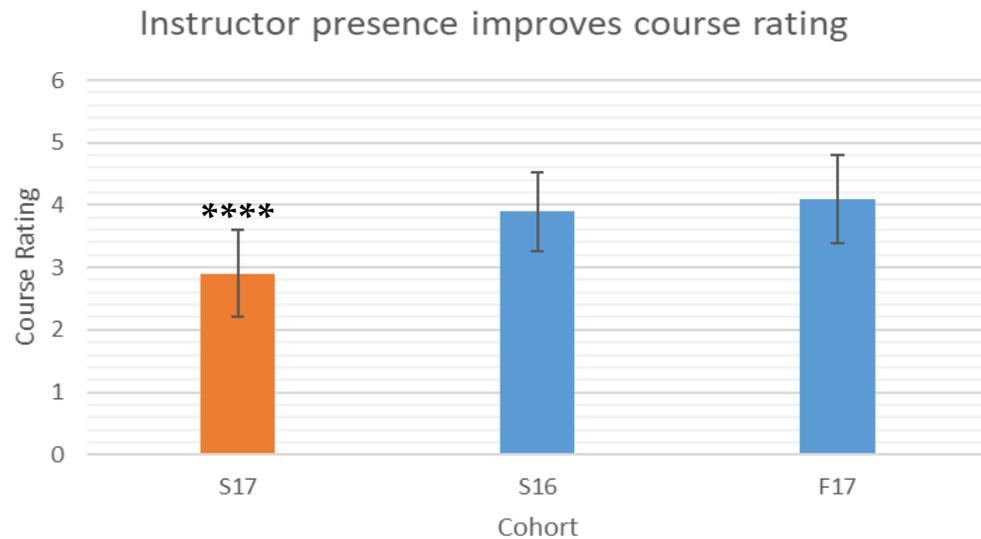


#4: Faculty needs to be in the room

- Course content delivered online by faculty
- TA-led sections
- TAs were all experienced and had taught class before with faculty.
- When TAs led all sections, most outcomes were negatively impacted.



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Worth it? The students seem to think so.

This is **one of the first courses I've taken at Purdue where I've felt like I've actually learned something and gained value from it.** This is a difficult course but Dr. Hart is an excellent instructor. She expects a lot of her students but it pushed me to become a better student and to really learn, understand, and comprehend the material.

This class is **extremely difficult, but it is very rewarding** when you put adequate time in to it. Even though designing my own experiment was a lot of work, I appreciate that the instructor does not grade on the outcome of the experiment and **allows you to make your own choices** as the purification process proceeds.

You **make us think for ourselves** on our labs by wanting us to understand what we are doing, what the effect is, and why we are doing the lab. Continue asking students questions during lab to make them think about those three things. It was helpful in the long run to produce an accurate report on the topic.

During the first few weeks this class was very difficult and confusing, but **as the course progressed I began to genuinely love coming to lab** for many different reasons. One reason is that in this lab there was a great deal of one on one time that allowed for me to truly understand the material. Another reason is that I enjoyed the chance to develop my own lab design and then run the experiment.

Worth it...?

- Colleges and Departments must prioritize what they spend resources on.
- A “butts-in-seats” model will be difficult for driving success in upper-level lab courses, even with competent TAs.
- Putting the resources in place for developing / transforming lab courses will benefit our students.



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