Objective of Redesigned Chem 237A
My objective was to restructure my introductory organic chemistry course to allow for faculty-student time to be devoted to applications of concepts and problem-solving strategies. Many students do not require significant faculty input to learn the basics. By moving to a hybrid format, introductory topics were introduced via online tools, and built upon during lecture discussions. The live discussions involved in-depth examples, demonstration of strategies for approaching problems, and discussion of the origins of the concepts (the thinking that brought about scientific discoveries). I want to teach students how to think like a chemist, not just draw like one!

The Anatomy of the Course:
- Chemistry 237A, autumn 2013, 8:30 am lecture time
- 327 students, 3.5 graduate student TAs
- 22% freshmen, 55% sophomores, 12% juniors, 11% seniors
- My fourth time teaching the course
- Students were already familiar with Canvas and Catalyst
- Guidance via the Technology Teaching Fellows Institute

Course Components
- Live Lecture Discussions
  - Clarification and application of fundamentals that were introduced online
  - Traditional instruction and demonstration
  - In-class ungraded work
  - Background presented in traditional format
  - Challenge problem presented
  - Small group discussion, volunteer answers
  - Focus on strategy for problem-solving, and then assessment and modification of answers (not simply right/wrong)
  - 1 in-person office hour per week
- Online Materials
  - Canvas modules
  - Organized by topic
  - Includes list of learning objectives
  - Some contain tutorials and mini lectures
  - Indicates online HW and textbook readings associated with each topic
  - Auto-graded online HW with tutorials, hints, and feedback.
  - Discussion board divided into topic areas, some included mini lectures
  - 2 online office hours per week

Student Feedback

Course Modules by Topic

Comparisons of Student Performance

Performance on “Concept and Applications” Problems from Exams:

Performance on Mechanism Problems Introduced Online (Mini Lecture) versus in Live Lecture:
- Provide an arrow-pushing mechanism for each of the two reactions shown below (you get to choose, make sure you know which one you must grade) (20 points)
- These mechanisms were taught during live lecture.
  - The average score on the exam was 14/20 = 70%
- These mechanisms were only introduced online.
  - The average score on the exam was 20/30 = 67%

Considerations for Comparisons:
- Initial course designs (prior to 2013) did not take long-term comparisons into consideration
- Some comparisons are between mid-quarter and final exams
- Lecture content, emphasis, and style changed slightly from year to year
- TAs and course components changed slightly from year to year

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