Re:Active Chemistry
Moving Chem 1 Out of Lecture and Into the Hands of Students

The Course: Principles of Chemistry 1 (CHGN 121)
Required for: All Majors
Current Enrollment: 850-900 in Fall, 75-150 in Spring
Traditional Delivery: 270 students/lecture, Multiple Faculty 3 hrs/week.

Issues Identified:
• Poor understanding & retention of key concepts
• Poor student engagement & preparation
• Poor student perception of usefulness
• No formative assessment, only multiple choice exams
• Course taught to ~40% of students who are “average”

20-30% struggle from beginning
15-20% end up with D, F, or W
20-30% more advanced students lose interest

Proposed solution: Smaller classes, less lecture, more interactive group work.

What have we done?
Added for ALL Chem 1 students:
• Online Homework
• Entrance Assessment in first week
  Underprepared students do required follow-up work

Ran PILOT COURSE (Fall 2015 & Spring 2016):
• Decreased to <100 students
• More flexible classroom
• Increased student accountability
  In-Class Quizzes
  Weekly “Task Sheets”
• Deeper thinking: guided-inquiry/discovery-based
• Diverse learning modes
  Daily group-work/discussions
  Worksheets & whiteboards
  Hands-on models, experiments, charts
  Interactive simulated experiments, videos, iClickers
• Provided rich feedback throughout

What are we still working on?
• Convert ALL Chem 1 lectures to active classes
• Develop Student-Centered Learning Outcomes
• Improve retention:
  Emphasize applications, modern challenges
  Connect to Calculus, Physics, Biology, NHI, Epics
• Differentiated learning
  “Simple” content = take-home work
  Challenging content = in-class
  Advanced applications for advanced students
• Increase connections between class & lab
• Evaluate success of changes
• Continue process with Chem 2
• Bring student-centered learning to upper-level courses

Benefits so far

Increased:
• Student Engagement
• Faculty-Student Contact
• Formative Assessment
• Group work
• Opportunities for Class Discussion

By the numbers:
• 50 student “active-learning” section compared to concurrent lecture sections of 270 students each
• All received same exams and online homework
  Assignments
• Smaller, active-learning section performed 10-20% better than students in traditional lecture sections!

Final LECTURE Grades

The Students’ Perspective

What they liked...
“The in class activities really helped me understand the material.”
“I think that compared to first semester, I have learned a lot more. The worksheets are a pain in the butt to do and not always enjoyable but my test scores have drastically improved since doing them.”
“I feel that the way lecture is structured is very helpful for promoting learning. Because we had a smaller class they were able to do class activities that ensured our understanding and held us accountable. Also we worked in groups so knowing if you missed class you weren’t only negatively affecting you, you were also affecting your peers, so groups were an incentive to go to class. Both teachers did an excellent job in explaining the material.”

What they want us to do better...
“The group work is a valuable asset for understanding concepts. That said, perhaps mandatory group mix-up would be valuable from time to time to encourage viewing chemistry from multiple angles.”
“While the in-class and take-home worksheets are helpful, I think working through more examples as a class would also be beneficial.”

Why we love the TrefnyCenter Cohort...
“In one month here with our colleagues and mentors, we made as much progress as we had over the past 2 years working on this course.”
“We have tried many new, good ideas over the years, but now we can implement them in a much more intentional, research-based way.”

June 2016 Cohort

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Trefny Innovative Instruction Center
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