

Use of Online Homework (MasteringChemistry) in General Chemistry Course Redesign

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General Chemistry Course Structure

- Conceptual, “atoms first” approach
- No concurrent lab
- Mixed application for mixed clientele:
 - 1-semester, stand-alone course for engineers
 - first of a 2-semester series in general chemistry for many others

General Chemistry Students

- Pre-professional (30%), engineering (40%), science majors (15%), others (15%)
 - ~85% have had high school chemistry, but course is taught with no prerequisites
- Typical enrollment 2500 students/year
 - 250 students/lecture (3x/week)
 - 25 students/recitation section (2x/week)
- Dropout/fail/withdraw typically < 10%

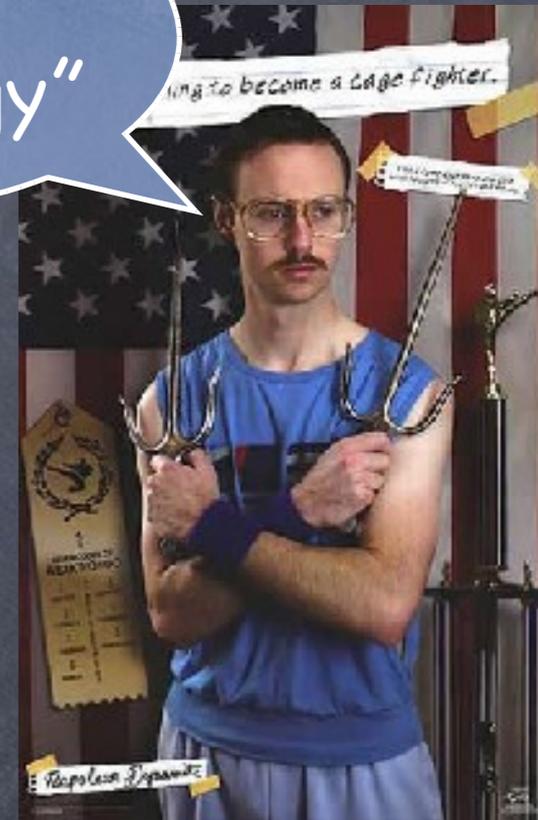
Challenges

- Large sections
 - little personal interaction
 - inability to give adequate, personal feedback (old homework system as example)
 - diversity of student preparation/background
- Course content (volume!)

Goals in Technological Redesign

- Engage students during lecture
- Give individual feedback
- Do this without
 - sacrificing content
 - increasing instructor load
- I use technology primarily for pedagogical reasons; assessment is a distant secondary purpose
 - this avoids potential concerns about security /cheating

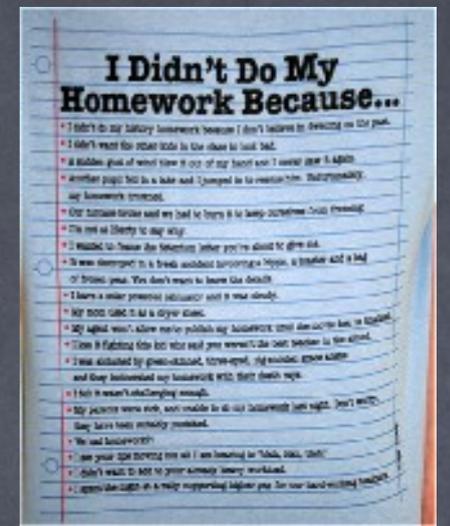
"I love technology"



Redesign Strategies We Have Used

- Use of recitation sections
- Use of Blackboard / "Micro Exams"
- Use of Chem Tutor (<http://www.chem.byu.edu/faculty/jdl/ChemTutorII/>)
- Use of iClicker quizzes
- Use of online homework (Mastering Chemistry)

MasteringChemistry Implementation



- Faculty participation was voluntary in Fall '07
- By Winter '08, all sections had adopted
 - Ranged from 1st time teachers to a retired faculty member who returned to teach
 - “Easier than I thought it would be”
- Use has since spread to the follow-on course (Chem 106) and to 2 courses in the GOB series

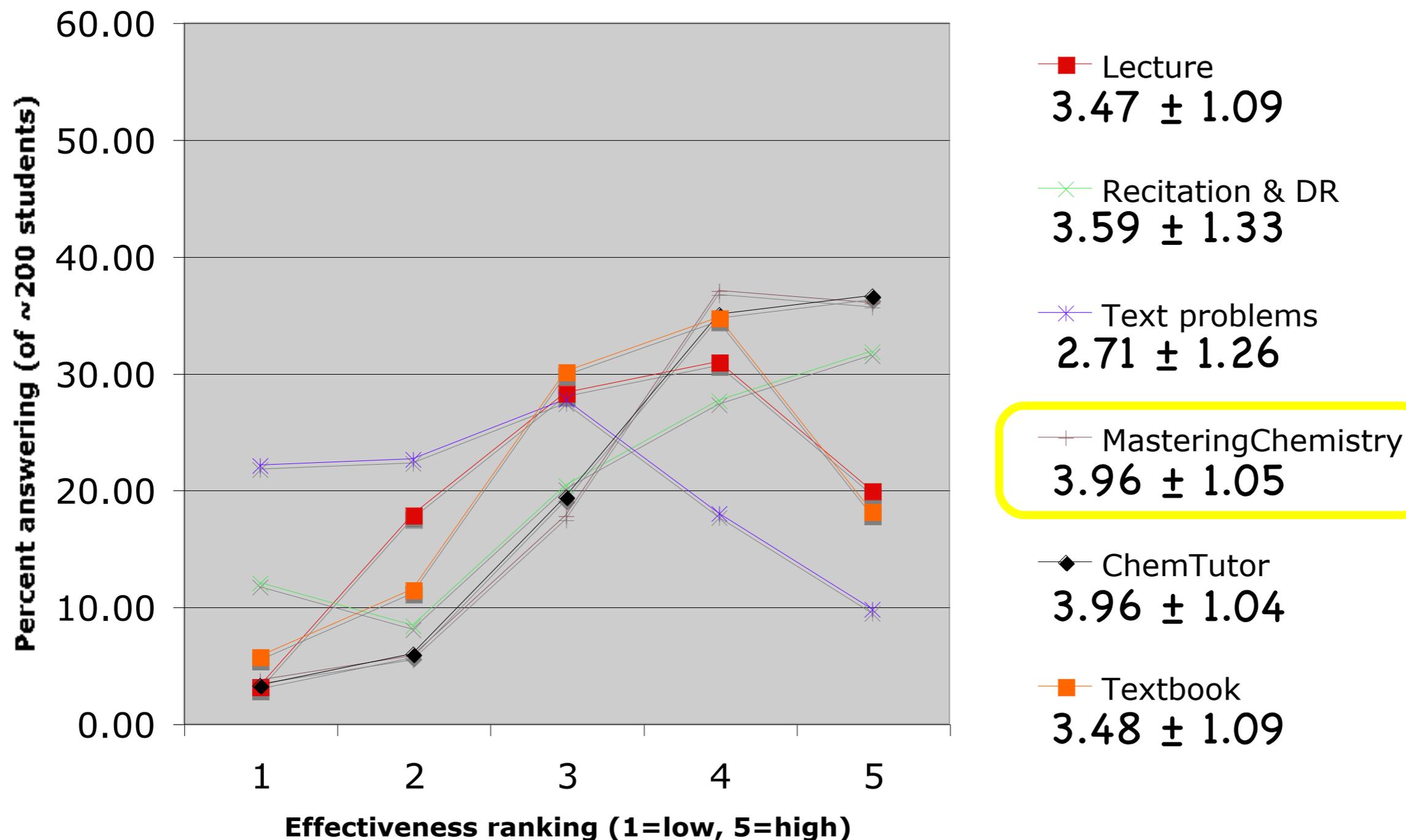
My Personal Experience with MasteringChemistry

- Adopted initially in fall 2007
 - 2 sections of ~225 students each
- Using again currently
 - 1 section of ~250 students
- Used the same multiple-choice exams both before and after adoption
- Conducted in-class surveys of student perceptions

Student Perceptions-Midterm

Dearden General Chemistry, Winter 2009

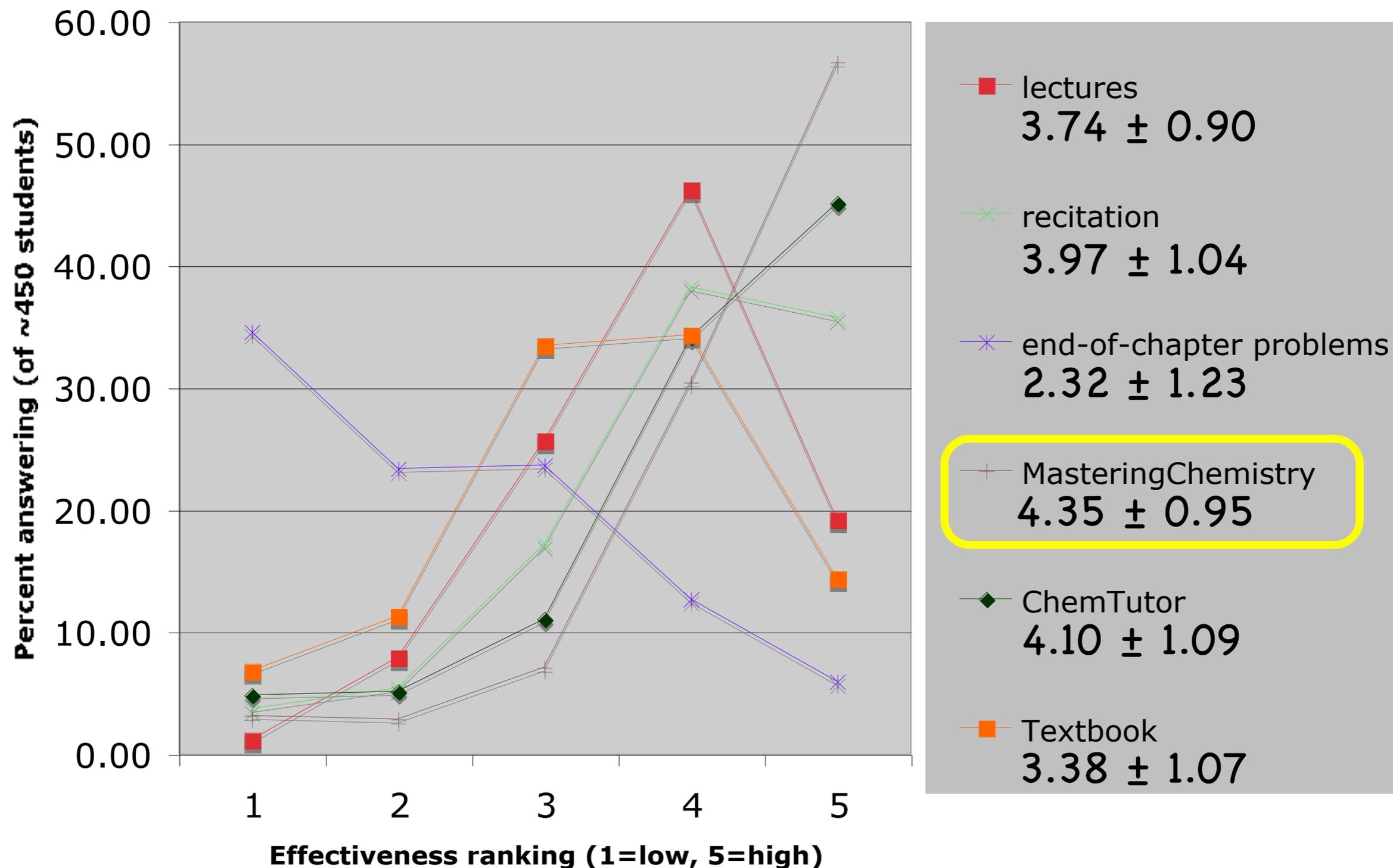
"So far, how helpful to you is each of the following in learning general chemistry?"



Student Perceptions-Final

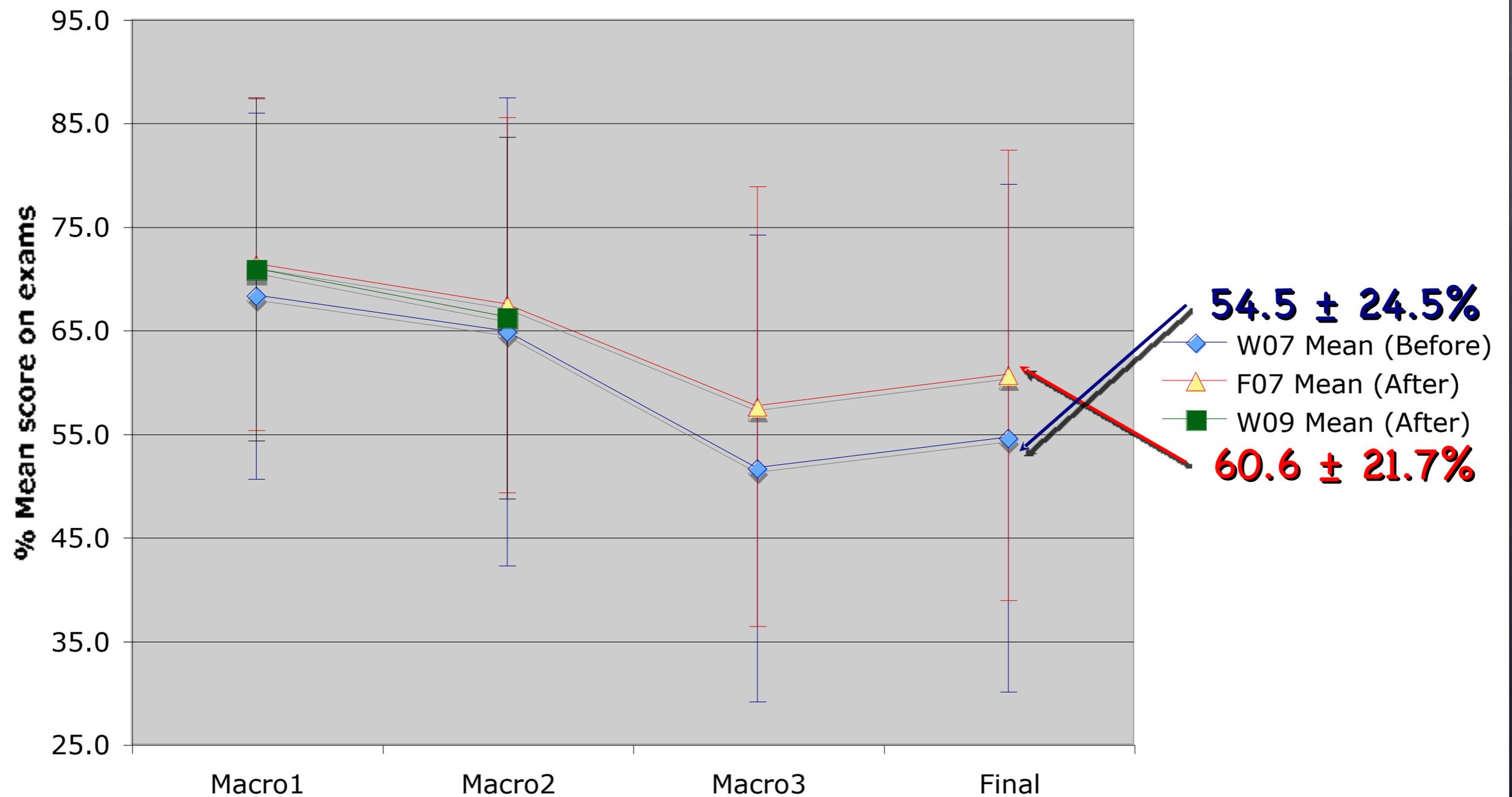
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"How helpful to you is each of the following in learning general chemistry"



Exam Scores

Before & After Mastering Chemistry





Acknowledgments

- BYU Department of Chemistry & Biochemistry
 - Chem 105 instructors
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National Science Foundation
WHERE DISCOVERIES BEGIN