GSI Teaching & Research Center
Fall 2014 Teaching Workshop

Faculty Perspectives on Teaching Science, Math and Engineering

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Senior Lecturer SOE
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2014-08-22 @ 2pm @ 110 Wheeler Hall

tinyurl.com/2014GSIGarciaPDF
tinyurl.com/2014GSIGarciaMP3

GSI TEACHING & RESOURCE CENTER

Use this tremendous resource early and often. Great information within!

gsi.berkeley.edu
Background & Setup

- I was just like you, once!
  - Fall 1992, I was a first-time EECS GSI @ Cal
  - I was bitten by the bug

- I joined Cal faculty in 2000
  - I received “lecturer tenure”, or “security of employment” in 2006.

- Summarizing all the lessons I’ve learned into 10 minutes is very hard!!
  - I’ll go through as many as I can…
Thanks tons to thirty terrific TAs…

TWELVE TIME-TESTED, THREE-WORD TEACHING TIPS
Before the Semester

- Share mutual expectations
- Know the material
  - It’s ok to say “I don’t know, let’s find out”!
- “How Children Fail”
During the Semester (1/4)

- Preparation, preparation, preparation
- Handouts, handouts, handouts
- Know your audience

- Piaget’s adaptation
  - Assimilation
  - Accommodation

Know your audience

Preparation

Handouts

Know your audience
During the Semester (2/4)

- Bloom: Tutoring + Mastery
- Get regular feedback
- Give regular feedback

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The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring

Benjamin S. Bloom
University of Chicago and Northwestern University

Two University of Chicago doctoral students in education, Garcia (1982, 1983) and Burke (1984), completed dissertations in which they compared student learning under the following three conditions of instruction:

1. Conventional. Students learn the subject matter in a class with about 30 students per teacher. Tests are given periodically for marking the students.
2. Mastery Learning. Students learn the subject matter in a class with about 30 students per teacher. The instruction is the same as in the conventional class (i.e., with the same teacher). Formative tests (the same tests used with the conventional group) are given for feedback, followed by corrective procedures and parallel formative tests. This procedure, repeated until the students have mastered the subject.
3. Tutoring. Students learn the subject matter with a good tutor for each student (or for two or three students simultaneously). This tutoring instruction is followed periodically by formative tests, feedback, corrective procedures, and parallel formative tests as in the mastery learning classes. It should be pointed out that the need for corrective work under tutoring is very small.

The students were randomly assigned the three learning conditions, and their initial aptitude tests scores, previous achievement in the subject, and initial attitudes and interests in the subject were similar. The amount of time for instruction was the same in all three groups except for the corrective work in the mastery learning and tutoring groups. Burke (1984) and Ananias (1982, 1983) replicated the study with four different samples of students at grades four, five, and eight and with two different subject matters—Probability and Computer Graphics. In each sub-study, the institutional treatment was limited to 11 periods of instruction over a period of three weeks.

Most striking were the differences in final achievement made by students under the three learning conditions. Using the standard deviation and the index of the central and the central class, it was typically found that the average student under tutoring was about two standard deviations above the average of the central class (the average tutored student was about 98% of the students in the central class). The average student under mastery learning was about one standard deviation above the average of the central class (the average mastery learning student was about 84% of the students in the central class). The variation of the students' achievement also changed under these learning conditions such that about 90% of the tutored students and 70% of the mastery learning students attained the level of normative achievement reached by only the highest 20% of the students under conventional instructional conditions (see Figure 1.)

There were corresponding changes in students' time spent in the classroom (60% under conventional instruction, 70% under Mastery Learning, and 90% under tutoring); and students' attitudes and interests (least positive under conventional instruction and most positive under tutoring). There were marked reductions in the relations between prior measures (aptitude or achievement) and the normative achievement measures. Typically, the aptitude-achievement correlations changed from +60 under conventional to +20 under mastery learning and +25 under tutoring. It is recognized that the correlations for the mastery learning and tutoring groups were too low to be meaningful. The language score under these learning conditions is about 40% of the central class. The findings are that under the best learning conditions, one-on-one (tutoring), the average student is 2 sigma above the average conventional student taught under conventional group methods of instruction.

The tutoring process demonstrated that most of the students do have the potential to reach this high level of learning. Indeed, an important task of research and instruction is to seek ways of accomplishing this under more practical and realistic conditions than the one-to-one tutoring, which is too costly for most societies to bear on a large scale. This is the "2 sigma" problem, can researchers and teachers devise teaching-learning conditions that will enable the majority of students under group instruction to...
During the Semester (3/4)

- Recycle great ideas
- People learn differently
- Let students drive
- Find your voice
During the Semester (4/4)

- Make it fun
- Don’t just lecture
- Nurture “Learning Community”
- Nothing beats enthusiasm
After the Semester

- Consider teaching career!
- Love your job
- Mantra: “Lifelong Learning”
“And in Conclusion...”

- It’s not the *teaching*, it’s the *learning*!
  - If student doesn’t want to learn, it won’t happen.

- Being an instructor is an honor & privilege!

- Will you carry the *torch* of inspiring teaching to your students?
  - Yes you will ... good luck!!

- *Ps.* uGSI+nGSI = TAs
Qualities I value most in a GSI?

- Better stated, “Qualities in a GSI that yield the best student learning”
  - Deep caring and respect for their students
  - More productive hours typically means more students helped, so “workaholics”
  - Create safe space for students to be wrong, to ask questions that seem “dumb”, and to help each other.
  - Make learning fun, make students want to learn.
  - Inspire them.
  - Push the top kids, and pull the bottom kids up
Specific Steps to Take to Succeed

- Be comfortable with silence (wait after Q)
- Expect to work a ton (set your expectations)
- Find the fun in it!
- Buddy TA (watch each other)
- Don’t make them transcribe what you do
- Give them problems to work on
- Short turnaround if instructor contacts you
- Speak your mind with instructor, if needed
- Learn from and help other TAs
First Week of Teaching, Good Start?

- Visit room and confirm A/V set up, get new pens
- Get the photos of your section from your instructor and memorize their names
- Exchange cell phone #s with TAs, instructors
- Make sure you’re at least 2-3 weeks ahead
- Create a fun, safe space from the get-go
- Communicate what you’d like with your apprentice before the semester starts
  - Wait, your instructor hasn’t created an apprentice model where younger students can get credit as “TAs-in-training” and attend all your discussions and give feedback & then get to teach one of their own?
Common Mistakes to Avoid

- Expecting to do any research when teaching
- Not making sure project is debugged; changes to spec after project has gone live
  - Even worse is when project encouraged code being put directly into starter file. When bugs were fixed and new starter file went out, students had to move their changes over. Frustrating!
- “Scooping” instructors
  - Don’t cover material before instructor
- Thinking you have to be perfect
  - “I don’t know, let’s find out!” is what you should say
Steps for Successful Collaboration

- **Share common expectations early**
  - Let instructor know of any commitments you have during semester (family, conferences, etc)
  - Understand how much outside of section you’ll have to cover (exam Qs, HW, projects)
  - Don’t be shy to speak your mind

- **Check-in with each other regularly**
  - Ask that instructor visit your section, give feedback
  - Try to work out any problems before they blow up
  - Speak up if you feel you’re drowning or struggling
How Should TA Address Problems

- Talk to other TAs first
  - Am I crazy here or was that offensive/rude?
- Talk to instructor 1-on-1
  - Hang around after the meeting, say “can I speak to you about something really quick”
- After trying both of these, talk to ombudsman or dept chair, but this is if you gave 1,2 a try
  - They’ll probably hear both sides and try to help you two try to communicate
- It’s never gotten past #2 for me in my 14 yrs
  - And even then it’s only gotten to #2 once or twice