

## Self-Critique of Math121, Fall Quarter, 2009

### **Most effective lessons/techniques and possible improvements:**

- Chapter packets. Designing and handing out a packet of problems connecting the sections we would be covering with real life applications (albeit sometimes cheesy ones) took time but was highly effective and enjoyed by the students. One way in which I could improve them would be to become more familiar with my final course objectives and then work backwards to decide what to include in the chapter packets.
- Jeopardy review. The challenge here was to keep everyone involved rather than a small handful of the quickest students. I set it up as a competition and “froze” students after they had answered 3 or 4 correctly to give others a chance. However, this still seemed to involve only a third of the class who were brave/quick enough to answer. If I do this again, I think I will drop the time restrictions and just have teams rotate turns.
- Tetris. I really want to avoid falling into the trap of becoming an entertainer who makes loose ties to the learning objectives and I was a bit fearful that playing Tetris might be a case like this. However, judging by the class participation afterwards, it truly was successful in accomplishing learning objectives. I would like to take more advantage of the discussion time following an exciting activity though. In other words, rather than the 5-minute wrap-up I did after the Tetris, it would be even better to use that common, highly-motivated experience to present investigative challenge problems for the students to explore.
- Problem-solving methodology game. I split the class into six teams and gave them a series of challenges where they had to determine a strategy, employ it, and then modify it upon seeing others’ strategy. Some students were half-hearted at first, but by the end of the activity, everyone was fully engaged. While this was an effective way of illustrating the problem-solving process, I could have enhanced this lesson by designing a simple and memorable acronym with the students to later use the problem-solving process.
- Extra credit proof. When covering tessellations, there was a problem that the book only touched upon and so I threw it out to the class as an extra credit problem if they could come up with a different proof than the book. I’m not sure how many students tried it, but one student came to me with an answer later- the important part was that this student’s abilities were much higher than the rest of the class and I think he was beginning to grow bored. He found the proof very interesting though and it gave us a chance to discuss what constitutes a proof (since he had never come to me during office hours to discuss math).
- Booster quiz. I took the hardest problems from the first three exams, changed their form slightly (and made them even a bit harder), and then gave the students 10 minutes to take the quiz. Any correct answers were then added directly onto their lowest exam score. The philosophy behind this stems from my personal perfectionist tendencies to replay any mistakes I make over and over in my head. Immediately

after any test, I make sure to understand why I missed a problem and how to correct it in the future, and I tend to end up with a firmer grasp on those concepts than the other ones. Offering a no-risk “redemption” chance at these problems was my way of rewarding students who took the effort to learn from their mistakes and boost their confidence.

- Around the world conversions worksheet. Perhaps the best part of this worksheet was the fun I had in creating it. I used real situations I had encountered when traveling and even correct prices and websites to entice students to travel themselves. Several students remarked to me that they had enjoyed that homework assignment. I think I could have (but didn't) used this for a productive class discussion. In general, I want to be more aware of times when the students are eager to discuss something and then use these moments to create space for productive dialogue.
- Polleverywhere.com. Dr. Klein suggested this website where students can text in answers. I used it as a form of pre-assessment on metric measurements, and it was highly successful. I'm seeking out ways to involve some of the quieter, less confident students without embarrassing them and this activity accomplished this goal.
- Student presentations. The first week was rather lackluster because I wasn't exactly sure how to guide the students in being creative. Before class on the last day of the first week, I had a 2-minute conference with the students who had already presented to assure them that they had done well considering my ambiguous directions, and then I discussed with the entire class how they could make their lessons more engaging. I was amazed at the sudden turnaround and the lengths students went to after that to make their presentations dynamic. Not only did it help the presenters master their own material and give at least two perspectives on the topic (the student's and my own) every day, but it also helped develop a sense of class unity that had benefits in class discussions during the second half of the quarter.
- Blackboard. I utilized blackboard heavily for announcements and emails to keep the class informed. I also sent out many individual (or select student) emails through blackboard to encourage students who had made particularly interesting comments in class, done something unique on GSP, or solved a question creatively on a quiz/test. I focused on students who weren't as outgoing in the classroom atmosphere and on students who were among the lower third in terms of class grades. Especially in the latter category, I noticed marked improvement in attention level and effort among these students. Since this only takes an extra couple minutes of my time when I'm grading tests or assignments, and potentially have a crucial impact on students teetering on the border of whether or not to invest themselves in the class, I would like to do this even more in the future.

### **Least effective lessons/problematic areas:**

- Special points of a triangle lesson – Although I was conceptually sound on how to construct each point (incenter, circumcenter, centroid, orthocenter) and its significance, I didn't spend enough time brushing up on my vocabulary and I accidentally interchanged incenter and centroid.

**Resolution and reflection:** A student caught this in the following class and so I immediately designed and distributed a handout clearly correcting the error. This was a humbling reminder that, even though these math courses may be several steps below my grad school level classes, I still need to invest sufficient time in mastering the content.

- Ratios/proportions – As I was initially exposing the class to ratios by asking them questions on the metric system via [pollmaster.com](http://pollmaster.com), I randomly picked one out to go through step by step. It turned out to be a complex, multi-step problem which I could have easily realized if I had more carefully designed the lesson. I carried the example through to the end and then quickly did some simpler examples, but several students remained preoccupied (and perplexed) by the more complicated example.

**Resolution and reflection:** Again, I designed a handout that night that carefully explained what had happened in class and connected the simple and complicated examples and then passed it out the following day. Looking back, I think a primary cause of this issue was my fear of “dead time” in the classroom. While spontaneity is good, taking a few seconds to evaluate things myself before going through them with the entire class would be wise.

- Surface area/volume – With only a few days of class left, I tried a new approach. Several students had asked for a Chapter 12 Packet (as I had done for Chapter 10) and so I designed one with some problems on surface area/volume. Rather than giving a lecture on these topics, I simply assigned the packet to be due by a certain date, and then we spent a class and a half going over them. The class had to team up to figure out the answers (small groups were divided into solvers, presenters, and checkers but the entire class was ultimately responsible for checking over the small groups’ results). I awarded a class score on each problem. The first setback was that several of the students quickly gave up on the problems because they “were too hard and we hadn’t yet covered them in class.” Secondly, some students were frustrated at receiving a grade for something I had never actually gone over yet – I had anticipated this and designed it so that they could get an A even with a handful of mistakes, but looking back, this is an unfair method of summative evaluation. As a side note, I distributed the course evaluations on this day, one of the most frustrating days of the quarter for many of the students. This may end up being a positive however because a frustrated student will tend to give more criticism that can offer room for improvement.

**Resolution and reflection:** I should have spent 5-10 minutes just generally addressing the concepts of surface area and volume and involving the class in a brief discussion as to how formulas could be modified before handing out the Chapter 12 Packets. I also underestimated how difficult this lesson would be for many of the students since it was so simple in my own mind. This was a case where I did a poor overall job of putting myself in my students’ shoes.

### **Overall points to remember and incorporate:**

-Spend ample time before the course or during the first week to become well acquainted with the learning objectives of the entire course. I didn't look over the final exam until halfway through the course and I realized at that point that it would have been much more helpful to know the intended completion goals before I began.

-Keep a balance between class coverage and student investigation. In other words, give at least an introduction or framework for every topic (unless perhaps it can be easily solved with pure intuition), but be sure to follow this up with appropriately challenging material for self-exploration.

-I know that one of my main strengths is in one-on-one/small group instruction and so, even though I regularly encouraged the class to visit me during my office hours, I think I should take a more assertive approach and individually encourage students who seem to be struggling with concepts to visit my cubicle at least once to see if it is helpful for them.

-Regarding differentiation, I need to make a more consistent sustained effort with the advanced students. I geared most of my lessons to the "average student" throughout the course and, although I occasionally threw out an optional challenge problem for the advanced students, I could have invested more effort in this, especially during the final month of the course when a couple of these students went on "cruise control." For the slower students, I re-taught material that was missed on an individual basis and then allowed them to resubmit it (except for tests).

-Be more consistent early on with enforcing the fact that our class would run the entire 50 minutes. On several occasions early on, I had students work on something during the last 10 minutes of class and then let them leave whenever they finished. This was fine during these class periods, but then students came to expect this and were quite antsy during the final 5-10 minutes on the times when I attempted to teach until the "bell." One way to handle this would be to design a daily student-involved summarization activity.

In particular a method used by some professors at Harvard is to have each student write down on a scrap of paper: 1. What they perceived as the main point of the day's lesson. 2. The biggest question/confusion they have regarding the lesson (or inspired by the lesson). These could serve as attendance markers, formative assessors, and an opening activity for the following day.

-Begin each class with a summary and/or connection from the previous day's lesson to the current topic. I didn't do this enough and I think it would have helped several of the students in their overall comprehension.