

# Teaching Philosophy

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As a teacher, I have two primary goals. The first is to help the student to develop the ability to routinely solve math problems without assistance. My second goal is to instill an appreciation for mathematics when possible – or, when necessary, to alleviate a student’s pre-existing fear of mathematics. These goals are complementary: a student who is math phobic – a phenomenon which is all too common – has little chance (or desire) to develop his or her mathematical ability, and a student who is unable to understand and solve problems is unlikely to develop an appreciation for mathematics.

Mathematics (as I often remind my students), like anything else worth doing, can only be learned through practice. This is the role of homework. The lecture is useful for initial explanation of new concepts, but mathematics is not truly learned during class time. A student could listen every day to the greatest mathematics lecturer in the history of the world, but even this would not be sufficient. No, mathematics is not truly learned until later, away from class, through doing homework. This process takes time – the student will sometimes struggle with the material and will often make mistakes. That is *good*; it is a natural and essential part of the learning process. Without that struggle, there can be no intellectual growth. Therefore, my role with respect to homework is not to *prevent* these struggles, but rather to *allow* them to take place – and then to help the student learn from them. Through plenty of practice and by learning from mistakes, the student will develop the ability to understand and to routinely solve math problems.

While lecture alone is an insufficient method of instruction, it is still an important part of the teaching process. Lecture is useful for each of the following: providing an overview of the material to be covered; motivating definitions and concepts (“Here’s why someone would care to do this...”); explaining how the current topic follows logically from, or is related to, something the student has already learned; demonstrating (through examples) effective methods of problem-solving; and – most importantly – discussing homework assignments.

Tests and quizzes serve two purposes. They are, of course, tools used to evaluate the student’s knowledge, through measuring his or her ability to independently solve problems. (This is significant, since evaluation is as important a part of the teacher’s job as is instruction.) But they also serve as motivational devices. Since the student knows that he or she will be evaluated based on his or her knowledge of the material, the incentive is there to prepare through practice and study. (Ideally, these activities would be motivated primarily by pure intellectual curiosity on the part of the student, but in reality I’ve found that this is rarely the case.) Therefore, tests and quizzes should be clearly written and consistent with the material covered in class (i.e., no huge surprises), and they should emphasize problem-solving over memorization. That last guideline is especially important to me – it’s my opinion that, far too often, memorization skills are *mistaken for* mathematical ability. However, I am far more interested in the student’s ability to correctly *use* a formula or theorem than in his or her ability to simply *memorize* it. Unless I expect students to be able to *prove* a theorem or formula, I generally provide it for them for use during a test or quiz.

In recent years, the use of technology in education has become an increasingly important issue. I have had some involvement in the study of the computer’s role in math education. I assisted

with a section of calculus which used Maple as an instructional device, and I have encouraged my own calculus students to use the **COW** (**C**alculus **O**n the **W**eb, an interactive web-based calculus tutorial developed at Temple University). Additionally, I have taken advantage of the internet to provide additional support to my students, by setting up class web pages and by making myself accessible through the frequent use of email. It is our responsibility as educators to take advantage of new technologies to improve our educational techniques. To me, the question is not *whether* we should use computers as educational tools, but rather *how* best to harness the tremendous potential of these resources. While the potential benefit is great, so is the potential harm; in particular, we must determine how to make use of technology in math education without allowing students to become completely reliant on the technology. I cringe when I see a student automatically reach for a calculator to perform a simple calculation, such as multiplying by ten; similarly, I would be disappointed in a student who had learned to rely on a computer to integrate or differentiate, say, a simple polynomial. We must teach students to use computers, as well as whatever newer, better technologies evolve in the future, and we must help them to become comfortable with these technologies; however, there must be some balance, to prevent the student from becoming dependent on these technologies. I believe that the standard should be this: a student should be taught to employ a technological device – be it a computer, a calculator, or whatever else – to accomplish tasks *only after* he or she has demonstrated the ability to perform that same task (albeit far more slowly) *without* the use of that device. This ensures that the student will learn to rely on his or her *own* abilities, and will use technology as a tool – not as a crutch.

Aside from teaching techniques, other aspects of my overall approach have proven to be productive and personally rewarding. In particular, I take special care to come across as a considerate, humble, approachable human being – which many students seem not to expect from a math teacher (or from college teachers in general). I make an effort to get to know each student, and to treat each student with the kindness and respect that he or she deserves. Although I hold the position of apparent authority in the classroom, I never forget that my students are the ones who (indirectly) pay my salary; I am their employee, not their boss. When students understand that I respect them and that I take my responsibilities to them very seriously, they are in turn more likely to care about their responsibilities to themselves, and thus to be successful.

After several paragraphs worth of explanation of *how* I teach, I find that I have not yet addressed the matter of *why* I teach. It isn't a question I think about often, because I rarely question my chosen profession. People tend to enjoy activities which coincide with their own talents, and I am no exception to that rule. I teach because I enjoy it, and because I'm good at it. I enjoy explaining concepts and methods to students, communicating my own enjoyment and appreciation of the subject to them, and (on occasion) awakening within them some ability or interest which they may never have realized before. I am gratified to observe a student as he or she learns to solve previously intractable problems – not just with my initial help, but eventually with no help at all.

In short, I teach because I believe deeply in the truism, “What you are is God's gift to you; what you then become is your gift to God.” I live this truth by striving to develop my own talents and abilities to their full potential, and by promoting the same in others. Teaching provides the perfect opportunity to accomplish both of these goals simultaneously. Thus, I view teaching not as an obligation, or as a just a job. Rather, it is an opportunity to serve and to grow; it is a privilege.