My teaching experiences in mathematics have ranged from tutoring students in the Lower Ninth Ward in New Orleans to being the instructor of remedial courses (algebra and precalculus) at Temple University to teaching upper-level undergraduate and graduate level courses at Johannes Kepler University in Austria. This wide range of experiences has given me insight into some of the core mathematical misunderstandings at their point of origin. These are misunderstandings that students carry into higher level classes. I believe the students should understand the difference between the mathematical language and mathematical computation. They should know that complicated math concepts are built upon simpler ones. Finally, the students must rely on problem-solving skills rather than formulas to solve problems, and they should not fear an initial failure, which can often help lead to new insights. This should take place in a collaborative environment in which the students are encouraged work with one another and develop their communication skills, learning to ask questions when they do not understand without fear of appearing ignorant.

The acknowledgment of the role of intermediate failure as an important step in ultimate student success is crucial. The process of learning mathematics is one in which one learns through failure in order to see the error of one's ways. The learning process becomes a crucible in which one's burns away initial misconceptions and prejudices so that all that is left is the pure product, a true understanding of the new concept. The flame of failure burns away what has been misunderstood and forces the student to revisit the concept. The acceptance of failure with grace so that one can learn from it and move forward is something that is not communicated often enough to young learners, and it is something that can be quite difficult to teach, as it goes against messages from various sources telling us that failure is never acceptable. However, it is something I strive to teach the students, as I have found it to be so important in my own development.

Many times, it is important to approach a math class as a language course. Math is a precise language built to be internally consistent. We use this language to describe and perform a large spectrum of computations. However, much of this can be easily lost on a student in the high school years of math education. It is easy to fall into the trap of thinking that many of these linguistic rules are mysterious, scientific truths. The math teacher takes the role of a priest with higher knowledge of mathematics. This leads the student to simply memorize formulas and repeat them back, catechistically, and apply them with no understanding of their meaning. I make an effort to pull back the curtain and explain to the students the differences between the linguistic concepts being discussed and their application to compute an answer to a problem. The goal here is to demystify the language of mathematics.

A component of demystifying new concepts is to emphasize that the math currently being learned is built upon prior knowledge and that what I teach in the present will serve as the basis for future material. No mathematical concept arises in a vacuum. The importance of understanding the cumulative nature of math cannot be understated. At all levels of mathematics, the key to solving a difficult problem is to recast it as a something for which we already have solution methods. I make it clear at the beginning of the first class that the students will always be responsible for past material. Weekly quizzes/exercise sheets are cumulative and all material taught since the first day is fair game, with ample warning as to the content of the weekly quiz. Furthermore, during lectures, I frame discussions of new material by reducing new concepts to ones already known to the students.

I have grown to realize, though, that to simply teach students what I think they need to know or how to solve particular problems ultimately does not produce students with a robust skill set. In reality, they must figure out how to use these tools on their own. Students need to get their hands dirty by solving problems without initial explanation from an instructor. The students must attack unfamiliar problems on their own to develop problems solving skills and to learn from their own failures. An explanation of how to solve a problem is much more helpful after the student has struggled.

As my teaching philosophy has evolved and I have compared my teaching strategies to other professors and instructors, I have concluded that my goals can be accomplished through collaborative learning. The students should learn to explain concepts to one another and be able to defend their solutions. The students should understand the broader concepts and learn how to solve problems by using creativity rather than by simply remembering (and regurgitating) all the formulas. The student should also learn to accept and embrace failure as a vital component of the learning experience. I will strive to achieve these ends as I continue in my career.