

In modern society the best and brightest scientists are entering research related positions with small teaching loads leaving minimal time for the effective teaching of undergraduate and graduate courses. One researcher may work on projects that affect 20-40 other scientists working in a related field, while one effective instructor can positively impact 50 young minds in a one semester course. Over 30 years, 3000+ students could gain a new appreciation for mathematics from a single instructor. While some young mathematicians have a personal goal of being the next great researcher, I strive to actively mentor and guide my students to develop the skills necessary to be the next great scientists whether it be through courses taught or research under my direction. Teaching mathematics is not only teaching methods and algorithms, it is teaching people how to think logically and efficiently.

I try to convey three central objectives in every course I teach. The first is that a student should, over the course of the semester, develop critical thinking skills. The beauty of mathematics is realized when one can step back and discover that a whole class of problems are solved using a given method and not just the particular example studied in class. This is not easy for students since it requires the ability to evaluate a given situation from a more general perspective. The second objective is to cultivate problem solving strategies. This is directly related to thinking and working efficiently. Students need a toolbox of potential methods in order to tackle a problem in an appropriate fashion. Once a student develops the skills of problem solving and critical thinking no problem should be too difficult. Finally, my most important objective is to encourage students to appreciate and respect the subject of mathematics. My goal is not to turn a room of 50 students into 50 mathematicians, but show each person through high energy presentations that math is important for the world around all of us. Once students respect what they are doing mathematically and see the value, they will spend the necessary time to excel in the course. Mathematics is a tower on which each course builds from the last. If a student passes a course without developing critical thinking skills, problem solving strategies, and a respect for the subject the next course will begin on an unstable foundation.

Having objectives is a nice start, but one must devise ways to meet them in the classroom. I begin the first day with the statement that the class will be based on mutual respect; I will treat each student with respect, but students must return that respect by regularly attending lectures and paying attention. In my personal experience placing the burden equally on student and instructor has been essential at stopping most potential problems before they begin. On the first day of class I convey four keys for success in every mathematics course:

1. *Do all the assigned homework problems.* Practice is essential for mastering the skills in any mathematics course.
2. *Find a group of friends that you can discuss homework solution methods with.* No one can solve every problem on his or her own, and it is important to gain from other's strengths. Teaching a solution method to another student is a great way to reaffirm the ideas.

3. *Do the practice problems from the chapter review section or sample exams.* This is the best preparation for the course examinations.

4. *As soon as a topic is unclear, make a point to ask me to clarify either during office hours or before/after class.* It is crucial to identify areas in which students are struggling before the exam and offer constructive suggestions on how we can work together to fix this.

To assist students in meeting the objectives, I post my lecture notes and all homework solutions on a course web page, so students have the resources they need to be successful. I have witnessed that students favor the lecture notes instead of the textbook when it comes to working through homework problems. These typed lecture notes have been successfully used by several other instructors in their own classes. One thing I have found to be effective, especially in upper-level courses, is to take a piece of my own personal research and simplify it so the ideas presented in class can relate to the research problem. Students have reacted positively when I have introduced Stokes equation for fluids as a basic linear equation which models real life phenomena while discussing applications in a differential equations course. Once the connection is made between mathematical theory and the physical world students develop a deeper appreciation and respect for the subject.

Objectives are great to possess, and strategies for implementation are even better, but one needs to be able to measure the effectiveness of both. Ronald Myers, Associate Professor of Veterinary Pathology, states “I have come to realize that ultimately students learn what we examine for. If we test learning of facts, students learn facts.” I believe if we design exams that test critical thinking, then students will learn to think more clearly and develop the necessary problem solving strategies. Mathematics is not learning facts, but instead it is learning how to learn and think deeply. There is no greater feeling as an educator than witnessing a student develop a deep understanding for a new idea. Once the light bulb goes on in a student’s head and that student is energized by the subject, it is like a torch that cannot be smoldered.

Teaching is a delicate practice, the impact one teacher can have on a student is immense. A good instructor can motivate students to work hard and learn; but a poor instructor can foster in a student the attitude that he or she lacks some genetic trait for mathematical aptitude. My methods have been well received by students as evidenced by consistently high teaching evaluations from twelve sections of eight different courses between the University of Akron, Penn State University, and Kent State University (*please see my CV for ratings in each course*). I want to continue to be an professor with whom students feel comfortable and from whom they seek help. Striving to be the teacher that makes the difference in each student’s education and encouraging them toward success is what motivates me. I, myself, am still learning and growing as a teacher and look forward to the opportunity to join a department where others share a passion for both teaching and research.

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