

INTRODUCTION

Throughout my education, I have been fascinated with numbers. The realization that people have been able to objectively describe everyday life with equations has excited me since I was young boy, and learning this science has been my passion ever since. My parents always taught me to question anything that I did not understand and to push myself to understand everything that I could. This foundation has allowed me to enjoy learning throughout my education. For years, I had no idea where my specific path would eventually end until I realized that my path never had to end. Learning is my path. I love to learn, and I always have. As I developed my problem solving abilities and gained the intuition necessary to become a successful engineer, I found that I also enjoyed sharing my love for learning with my peers, my mentees, and my students.

TEACHING PHILOSOPHY

As educators, our goals are reasonably straightforward. We strive to pass our knowledge to the next generation so that society can reap the rewards. How we go about sharing this knowledge, however, will have a significant impact on the student and, therefore, society. To achieve these goals, I implement the following four objectives, as detailed below.

Continued Enjoyment

Develop a passion for learning. If you do, you will never cease to grow. – Anthony J. D'Angelo

Above all else, a person must enjoy what he or she does to reach the pinnacle of his or her growth. Without this enjoyment, life will never seem complete, and productivity will inevitably suffer. Finding work that satisfactorily stimulates the mind is not always easy, and the journey to finding such enjoyment may take years. However, an educator can significantly aid a student in this quest.

By bringing genuine excitement about the physical world to discussions with my students, I strive to promote this enjoyment in education on a daily basis. I believe that encouraging curiosity and exploring relevant tangents is important to solidify understanding of connections in complex ideas. Each student is an individual, and understanding each student's passion and exciting it can drastically increase the enjoyment of education.

Structured Perfection

Strive for perfection in everything you do. Take the best that exists and make it better. When it does not exist, design it. – Sir Henry Royce, Engineer

Describing the world using physics is not an easy task. If an educator can create an objective understanding of an abstract topic that may seem otherwise subjective, the student is more likely to retain this knowledge. However, this retention can only be perfected through repetition. One method that I teach to structure problem solving in a way to minimize mistakes is abstractly outlined below.

- Preparation: understand the problem, and collect information to facilitate problem solving.
- Initiation: determine a logical path to follow to optimize success in finding a solution.
- Recognition: evaluate how the problem is similar or different from past experiences.
- Resolution: solve the problem while making as few assumptions as practically possible.
- Evaluation: decide whether the solution is physically reasonable.

Physical Intuition

It is through science that we prove, but through intuition that we discover. – Henri Poincare

The physical world can be daunting to both the novice and the supposed expert. However, through years of education and problem solving, fundamental intuition for the physical world can be obtained. Promoting this intuition as an educator can prove difficult, as each individual experiences the world uniquely. But, I do believe that students can gain intuition by asking the right questions and determining the physical meanings of mathematical solutions. Ensuring that students appreciate the governing physics on a molecular scale significantly aids the fundamental understanding that is necessary in an industrial setting. To aid this molecular understanding, I often use cartoon drawings, representative models, or physical examples to assist the student's growing intuition about a subject.

Through open discussions, I facilitate the assembly of different elements of a problem through piecewise steps. Many times, a student has all of the knowledge that is necessary to obtain a solution, yet the bottleneck in the process is the student's ability to link these simple thoughts together in an appropriate manner. By guiding the student through his or her own thoughts, I am able to promote a deeper understanding of the topic within the student. Often times this guidance is accompanied by previous experiences that have analogous conclusions and by discussions in a smaller, more focused group. Thus, getting the student out of the classroom and into the real world, whether that real world is a laboratory or the student's backyard, is an integral element of my teaching style.

Self Motivation

Learning is not attained by chance, it must be sought for with ardor and diligence. – Abigail Adams

I was once told prior to an examination that I needed “to know what I know, to know what I don't know, and to know what I don't know that I don't know.” Although this idea seems extreme, I believe wholeheartedly in the idea that people should understand and clearly define the limits of their knowledge, while constantly pushing those limits outward. To achieve this idea, a person must strive to want more – to stay motivated to learn as much as possible about life in general – if not to obtain explicit knowledge from a source, then to at least appreciate the subject matter.

Remaining self motivated is difficult in practice, so advocating the need is daunting at times. If continued enjoyment of learning is present, I find that continuing to challenge my students often feeds self-motivation even after classroom challenges cease. The desire to know the intimate details of a subject, while rejecting the acceptance of a shallow, passing knowledge, can be self-propagating once a student appreciates the immense satisfaction of deeper knowledge through asking the right kinds of questions.

TECHNOLOGY

As a function of our society's persistent drive for knowledge, the amount of information that is now both available and required for a new engineering student is becoming overwhelming. As we continually advance, the next generation is left with a choice to either be content with the technology of the past or to make the most of past knowledge to invent the technology of tomorrow. I promote the usage of technology as much as possible to relieve the tedium of problem solving that is now invariably present in today's world. Learning what tool is appropriate for a given task and learning to leverage as much usefulness as possible out of that tool are two traits that can significantly improve an individual's productivity.

CONCLUSIONS

A passion for learning is not always easy to maintain as years of education can stress the will of students. Yet, the right teacher, coach, mentor, or peer can open the eyes of the learner to the joy of education, improving the path to a successful career.

I enjoy teaching at all levels and in a variety of atmospheres from the classroom to the laboratory. I strongly believe in promoting undergraduate research. I am confident that I can succeed in teaching any of the core undergraduate courses in the chemical, mechanical, and polymer engineering curriculum as well as a variety of graduate courses. I have successfully taught core graduate courses in chemical engineering analysis, fluid flow, and mass transfer, as well as an elective course in colloids and interfaces. I am also interested in creating new courses at both the undergraduate and graduate levels in topics including rheology, complex fluids, capillarity, low-Reynolds number (Stokes) flow, and applied mathematics to name a few.

I am convinced that the answer to any problem can be achieved through education. Classroom work, open discussions, and first-hand experiences can lead to solutions, and equipping the minds of future generations with the will and the tools to find these solutions will improve society as a whole.