Teaching Philosophy

Biomedical Engineering

Importance of having big picture in Engineering

It is critical for an engineer to have a sense of the big picture of the technology on which technological decision-making is based. In addition to basic, technical information, this big picture includes insight, communication skills, and decision-making skills. We have learned from history that many decisions related to technology were affected by non-technical facts. For example, before the space shuttle Challenger was launched, NASA engineers had technological expertise to diagnose the potential problem of the o-ring. However, they lacked clear insight into what impact the o-ring problem might have on the launched space shuttle. This lack of vision and compromised communication skills resulted in a failure to persuade the director to stop the launching of the shuttle. What mattered in this case were not the technical details themselves, but the insight and the communication skills affected on decision making.

Teaching method

My goal for student learning is to develop problem solving skills, analytic skills, and, ultimately, ability to think holistically in order to synthesize a creative solution and/or an insightful advice, and to deliver them successfully. To develop these skills, it is essential to get trained to think critically and actively. One good training method is to conduct an engineering design project. In conducting a design project, a student learns how to: (1) define and analyze a problem, (2) find and assess a solution, and (3) deliver this solution to end-users. When teaching design classes, in order to help students develop these skill sets, I have tried to encourage them to find solutions by themselves, instead of simply giving them my solutions.

One specific example of my teaching style (or rather coaching style), is the experience I had with a design project team who had built an electric circuit for their electrocardiogram (ECG) device that did not provide the expected output gain. The problem was that they had used too low value resistors. These low resistors, combined with the intrinsic resistance of the bread board they used, created a larger effective resistor value than expected. As a result, it came up with a different output gain. I essentially asked probing questions to make them aware of the things they need to consider. With discussion, they were able to isolate the problem and solve it. The beauty of design projects is that students can also develop the ability to work productively with others, acquire leadership skills, and learn to organize and use time effectively.

Assessment

I understand the goal of assessment in engineering education is not just to determine which student is –more knowledgeable than others and give them a letter grade, but to motivate students to achieve their goals set in the class. To guide students to achieve these goals, I have learned that writing term papers, writing user manuals, and giving final project presentations is more effective than taking exams for design classes.

Creation of inclusive environment

A sense of concern and encouragement from the teacher can provide students with the confidence and desire to overcome obstacles during the learning process. Learning begins with

communication with the instructor. The effectiveness of this communication largely depends on the interpersonal relationship between the student and the instructor. Through the courses that I have taught, I learned that students who received timely guidance and advice learned a lot faster than ones who did not get it. I also noted the importance of the interpersonal relationship from my work experience in a company.

While working on my PhD in Biomedical Engineering, I was given an unusual opportunity to serve as CEO for a company in China where I discovered my passion for interpersonal relationships. As the CEO of a food company, my job was to oversee all aspects of the business: farming, distribution channels, quality control in the factory, and executive decision-making. I became the CEO, succeeding my predecessor who suddenly fell ill. Because of the sudden change of leadership, there was significant turmoil in the company during the initial phase of my term. I stepped in and led 200 employees, many of whom had limited experience working with people from different backgrounds, sometimes resulting in cultural misunderstandings.

I strove to build mutual, trusting relationships with my employees through interpersonal connections and immersion in Chinese language and culture. I also hosted one-on-one meetings and participated in activities with employees to build strong teams. Not only did I change the culture of our organization and increase positive relations, I also achieved increased revenue of 25% and doubled our manufacturing capacity. The company also maintained a number one market share in Shanghai and Qingdao. These achievements were founded on the interpersonal relationships. Of all these achievements, the most valuable outcome was the meaningful relationships that I established with my employees. My experience in China has prepared me for the kind of intercultural leadership required in the teaching of diverse students.