

Matthias W. Pleil - Teaching Statement

Background

I have loved teaching since my first experience as an undergraduate physics student at Southern Illinois University. I had the pleasure of tutoring Naval ROTC students in physics. I learned the value of hands-on learning as a graduate student; I taught labs including basic physics and optics. This experience provided me with the confidence that I could impart knowledge and skills to others and make a positive impact on student learning.

After graduate school, I began my career as a process engineer. This job included continuously improving the manufacturing processes – time, cost and quality. As a result, my colleagues and I were continuously improving our skills and knowledge. One of my responsibilities was to train and educate our technicians and engineers. I learned how to write specifications and training manuals. This part of the job was very rewarding. I really enjoyed working with technicians one on one, teaching them not only the procedures, but the STEM concepts behind what we were doing and why we needed to improve. The most fun part was implementing Standard Process Control (SPC) on both product and machine parameters. The training of the equipment technicians was most challenging as they always wanted to adjust to nominal – it was a paradigm shift for them to adjust based on out of control conditions. It took some doing, but I managed to win them over.

Unfortunately, my days in industry came to an end in 2002 with the down turn of the economy. I was laid off. However, another door opened as TVI (now CNM) was looking for a person, with some industry experience, to teach in the Applied Technology department. This was the start of my formal teaching experience. This department educated technicians to work in industry. Most of the classes included hands-on labs where the lecture material came to life for the students. In the first year at TVI, we submitted an NSF proposal to develop and disseminate MEMS (microelectromechanical systems) related curriculum. This NSF grant, entitled “Southwest Center for Microsystems Education” (SCME) started in 2004 and has been renewed consistently since. The SCME grant was moved to UNM in 2008 and now continues as a support center. Throughout this time as the PI, I have provided many dozens of workshops for educators, mostly hands-on, presentations at dozens of conferences on our work, and have created hands-on kits with online short courses, whereby educators can learn and provide their students with the knowledge and skills needed to provide value to our country’s emerging technology industry.

Facilitating Learning

Learning occurs through a number of different paths and depends on the student’s previous experiences, attitudes and natural abilities. Some students are primarily visual learners, others auditory and there are those that learn best through tactile experiences. I have found through the years that our mechanical engineering students are primarily hands-on learners, they learn best by applying what they have learned.

All of my classes include a mix of different teaching methods. Traditional lecture provides students with an organized story and set of notes (always posted). Within these traditional lectures, I often include 2-3 minute free writing activities whereby students are asked to either recall information and/or make connections between topics. They write it down, sometimes collaborating in small groups. These are followed by a class discussion. In addition, iClicker questions are provided throughout the lecture. These require the students to recall information they were just exposed to. It is the process of recall, not encoding (note taking) that the students solidify their understanding and build their knowledge base.

Teaching Style

My mantra can be summarized in two words: “Continuous Improvement”

I mention this often to the students, “Engineers are after continuously improving existing systems and products as well as themselves.” This applies not only to personal knowledge and skills in their field of choice, but also in their professional and personal relationships.

I provide students the opportunity to turn in drafts of major assignments where I review and provide feedback, often in the lecture environment, so that other students and teams can learn from each other. I try to make this a safe environment, not putting individuals down but rather providing feedback for improvement.

My main goal is to continually improve my teaching so that the learning experience for the students improve and make them better prepared to provide value to future employers.

Having 12 years’ experience in high tech industry and 16yrs in higher education, I am well positioned to understand what graduates need to demonstrate to future employers in order to be marketable, value-added and land a job. Most industry advisors on my various education grants state that students are generally well prepared in core STEM knowledge, but lack in the essential (“soft”) skills and hands-on experiences. Therefore, in all of my courses I have the students not only learn the knowledge and skills presented in the course but also work together on project teams; I encourage them to form study groups to collaborate and help each other be successful as this is core to successful companies.

Evidence of Student Learning

Evidence of student learning includes several elements. Of course, standard exam and homework grades are important and provide feedback to the students as they progress through the course materials. In addition, student teams present on their projects. I record these presentations and provide them links through UNM’s internal OneDrive system so that they can review their presentation and look for opportunities for improvement. When student teams nail the presentation – this is evidence they have learned the core competencies AND applied them within a team project. The students learn from each other and learn how to work together for a common goal.

Creating an Inclusive Environment

I have several activities early on where students introduce themselves to each other in class and online. The book I use for Engineering Design I is written by a woman and includes self-study videos that she narrates. I show TED talks presented by people with disabilities talking about challenges they have and how we, the engineers, need to design better for everyone. I also provide information on the various student groups such as the Women in Engineering, American Indian Engineering, LGBTQ resources, and encourage students to join these groups. I encourage these organizations to come and present to my classes and also push meeting notifications through Learn announcement and in class.

Continuous Improvement of Teaching

As mentioned previously, I have “continuous improvement” in my DNA. I’m always looking to better ways to teach to match the needs and wants of our evolving student population. For example, I was the first instructor in my TVI days to create an online course in the Applied Technologies department. Back then, we used WEB CT for course delivery. As we all had to complete an online teaching certification course, I leveraged the various learning management features to maximize learning opportunities. I discovered several ones the instructors of the course didn’t know about and cross-educated them and the rest of the class. It was a lot of fun learning with other educators.

In industry, I created an internal website (back in the 90’s) for engineers to find key project reports and data. This was in the day of needing to code in HTML, I was self-taught in this. This was the spring board to creating online educational resources as part of my NSF grants and is leveraged in my course development as well. I was the chair of an advisory team on two educational film projects with Ruth Caranza resulting in two films on Microsystems and Nanotechnology.

I attend professional development workshops whenever I can, these include online webinars, UNM CTL workshops and online courses. Most recently I applied and was accepted in the UNM Teaching Fellows program. This is a very good program, I enjoy collaborating with other educators from other departments.

I am always implementing new methods in my classes, I pay attention to student feedback and try to be as approachable as possible.