The best scenario in teaching and learning occurs when teachers play to their strengths and allow students to play to theirs. It cannot be considered great teaching if great learning doesn't follow. I believe student engagement to be the key. My teaching style balances instructor guidance with student autonomy to maximize both learning and motivation.

My lecture style is a mix of dry humor, analogies (occasionally good), traditional lecturing, live demonstrations, and student activities. I'm not there to entertain, but heaven help me if I bore them to death. I practice my lecture immediately prior to entering the lecture room. I do this even if this is the 10th consecutive semester of delivering the "same old" lecture on diodes. Once in the lecture room, I talk to the students. I don't talk to my slides. My slides don't get my humor and my slides don't groan at bad jokes. I forget myself and let my excitement show through. "Does he really like Nodal Analysis that much?" the students wonder. Of course not, but I do enjoy teaching. I enjoy explaining how things work. I like developing the lecture that will best convey those ideas to the students, the demonstrations that elaborate on these solutions, and the interactive exercises that help students build confidence to move forward. I know the success of some future company doesn't rest on their ability to find the voltage across a resistor. This is only a steppingstone for them as they learn problems can be solved through creative thinking and systematic application of tools they hone over time. I keep what works. I polish my approach each semester where rough edges show. I scrap and start over when the approach is a virtual train wreck.

I'm asked to teach a **large class and provide quality at scale.** But the truth is, I would rather <u>not</u> lecture to the masses. What instructor can't instruct much better in a small, ten- person session where the group becomes close-knit and the conversations get interesting? Or even in a one-on-one session with a student? So how do you teach a room with over 150 students, many who are first-year students, and with great diversity and experiences (often lacking STEM backgrounds)? You must turn to best practices in teaching and learning, especially those focused on student engagement. Diverse backgrounds become an advantage in an active-learning session and the students can generate great questions when you use tools that help to build interaction.

With large classes, you can't spend intimate time with every student. You must release that notion that you are the only person in the room capable of teaching. Give these students credit. Your presence as the master, in many ways, can hold them back. In lecture, have them work in teams. Make them report on their solution by calling on their team. Don't let them wait for you to provide the "expert solution." When left to their own devices, someone will find that nugget of knowledge that moves the group forward towards a solution. Expert solutions are great, but many students need to also see what other struggling artists are doing and draw motivation from that. Labs are no different. Yes, you need students to do things alone occasionally for learning and assessment, but you also need them to work in small teams to build community and experience the wisdom of that non-expert solution and recognize the value of diversity in approaches.

What about the students who continue to feel that they just can't quite turn the corner to success? **One-on-one interaction** is needed. At this level, I often serve as a personal tutor. The role here is not to provide a lecture, but to assess the student. I always talk with the student briefly, "How did you feel walking into the last midterm?", "What topic do you find easiest?", "What topic do you find most difficult?" I will draft, on the fly, a problem that I feel would be near the edge of the student's ability and, with gentle encouragement, have them talk out loud while they edge forward on the problem using

primarily their own volition. I commend the student on successes and provide suggestions when they feel they have no starting point. The most difficult part of this process is literally getting them to put the pencil on the paper and *start writing*. After that, it gets much easier. Once the student builds confidence and can self-assess at some level, they have truly turned that corner!

My course reviews (student feedback via ICES, Instructor and Course Evaluation System, forms) in my early "TA days" were good, but never made the "excellent" rating. I asked my mentor (who regularly made the "excellent" rating) what he thought I might change. His (rather humble) response was that "Being rated as excellent might just mean you are a pushover [an easy grader, perhaps]." I couldn't accept that and would refuse to go that route. While ICES forms are not the best assessment of a teacher's effectiveness, I began to consider what those ICES forms *do* relay to instructors.

Then, in 2005, I met a significant challenge. I started to teach a general education course <u>in</u> engineering <u>for</u> non-engineers. While being designed for non-engineers, its first offering had been to James Scholar students, but then enrollment was opened up to the general population. My first time teaching at the freshmen level and to non-engineers was a rude awakening! The material was challenging and broad, I was using terms that were unfamiliar to them (what is a coefficient?!), and (according to a couple vocal students) I seemed to think everyone wanted to become an engineer! Without the ICES feedback, I might not have fully understood the issues or known how to react. Student feedback to instruction provides some measure of student satisfaction even if it may not correlate with instructor effectiveness...and **student satisfaction is related to student engagement and engagement is related to teaching effectiveness.** I started to pay deeper attention to what the students were telling me and what aspects of their feedback were worth incorporating into my methods of teaching and learning. The grade distribution didn't change significantly, but my scores began to grow.

Today, I continue to read and react to student feedback, each and every semester, always seeking to improve. I find out what obstacles are hindering student engagement and look to best practices to remove them. With my peers and broader Community of Practice in teaching and learning, I regularly seek out known best practices. I am careful with my time; first adopting best practices that fit my style and personality and then investigating those that seem more foreign to my nature. Occasionally, I see a gap in teaching-and-learning that either requires a new solution or that the current solutions may require further study. It is beyond my nature to look at something and say, "That's perfect, don't change a thing!" In my mind, improvement is always possible.

Now that students are engaged, how do I supercharge the learning environment? This is where I return to my original thesis, "The best scenario in teaching and learning occurs when teachers play to their strengths and allow students to play to theirs." I am a big fan of working with students to find their interests and then helping to map those interests into projects. Hands-on projects with some level of autonomy motivates students to devote time and effort into the learning process. In fact, they often neglect to consider engaging activities as part of their "workload". Every lab I have taught in the last fifteen years has incorporated a level of autonomy including open-ended projects. My innovative research in content personalization allows students to find interesting topics for these projects even for 450 students (ECE 110) each semester. I have incorporated hands-on learning that serves around 70 first-year James Scholar students and 50 under-represented students each semester (Merit, ECE 199 sections 110 and 120). I serve as the primary mentor for a student undergraduate research group (*WaggleNet)*, a new student RSO that serves as a cross-campus incubator for entrepreneurially-minded students and faculty, and the Midwest Robotics Design Competition that brings teams together from all

over the globe to compete in EOH each year. I believe all of these hands-on opportunities allow students to learn and grow, and ultimately "supercharge the learning environment".

But what happens when the **learning environment changes**? These past few months, the learning environment was totally turned upside down with the onslaught of COVID-19 for teachers and students alike. But for me, it wasn't the first time. I had a similar event two years ago, when my back suddenly went out, and I could hardly move from the couch. Instead of passing the work to others, I learned that I could teach remotely. Suddenly, I was learning to lecture through a virtual presence in the classroom. My humor didn't even change as I started the Halloween lecture with the Wizard of Oz, "Pay no attention to that man behind the curtain" video. So, the past few months have been an expansion of that experience, now using Zoom for all my one-on-one sessions, office hours, lectures, and staff meetings. I adjusted learning objectives on the fly and worked with the staff to achieve them, but proudly feel that we did not compromise the integrity of the course in the process.

To conclude, I will admit that I teach for somewhat-selfish reasons. I appreciate the students for the time they spend in lecture, in homework, in lab, and in exams, and I consider it all payback for the time I spend with my staff developing and improving these materials. I live for the little moments when a student comes up to the front of lecture just to tell me they really enjoyed a topic. I remember the times a student in office hours tells me, "Thanks. That really helps!" It means something to me when a student visits me about a low midterm grade and, after a couple of one-on-one tutoring sessions, improves by two letter grades. I can't forget finishing a lecture to broad applause from the students. I teach because the effort is appreciated, and I feel the appreciation in the acts and statements of the students. I appreciate that this shows in the end-of-semester feedback from the students where typical comments include, "Prof. Schmitz is really enthusiastic about the material," or "Prof. Schmitz always remains after class to answer questions for us." Also, as an undergraduate advisor, I am proud when a student returns to academic success after meeting with me for consultation. The success is the student's own doing. I don't do their homework, build their lab circuit, take their exams, or design that final project. I'm happy to be the junior-varsity coach and watch these students progress to greater achievements in life.