I am a very “hands-on” teacher; at least, I am as much as possible. I teach courses about surveying and mapping, which has both an applied skill, in which students learn to use equipment and software, and a technical knowledge base, in which students learn theory and concepts that underlie the skills. In my experience, question-driven learning is the most effective. I see my role as an educator as mainly to ask students the right questions that lead them to the knowledge they need to know. Here are some principles and tactics that I use to frame my philosophy.

Principles:
be fair
care about the material
care about the students
be as simple as possible
exploration leads to learning
respect the students’ experiences and perspectives
“teacher” is a misnomer. (so is “healer”.) better to be a coach
knowledge comes in through the fingers, not through the ears
until a question makes room, there is nowhere to put the answer
minds are sponges: once they’re saturated, no more absorption occurs
realize that the student does not already know what they came to you to learn

Tactics:
be funny
blow their minds
surprise the students
lecture as little as possible
tell stories instead of lecture
use PowerPoint as little as possible
share experiences and perspectives
sometimes teaching means doing nothing
use repetition from different perspectives

For a full Statement of Teaching Philosophy, keep reading….
Statement of Teaching Philosophy – Dr. Thomas Meyer

30 September 2013

"Education is not the filling of a pail, but the lighting of a fire." - William Butler Yeats

Teaching to Inspire

Building on Yeats’s metaphor, I liken my role as an educator to finding the fuel, laying the firewood, and striking the spark. If I did my job well, the fire will feed itself thereafter. My philosophy is to teach to inspire.

Big ideas are some of the best things we can share with our students. Professors have learned things few other people know, ideas so big that they can challenge how we live our lives. For example, things that seem immutable might not be. Happiness is defined culturally, not universally: many civilizations throughout time based happiness on different values and principles than those common today. Also, some things that seem imponderable can be understood. In mathematics there are things that are both infinitely large but are not the same size. I find it amazing that people can tackle the problem of rigorously understanding infinity at all, can reason about it, and have discovered that its properties are very surprising. I sprinkle my lectures with big ideas and let the students explore them during class. I regularly receive unsolicited follow-on emails from students who were excited enough that they delved in to the subject on their own outside of class, and, years later, I have even had a former student stop me in the airport to reminisce about that experience. For many students, life is bigger than they know. The universe of possibilities is bigger than they know. I want to give them a glimpse of what’s out there. When I teach a class, I ask myself what concepts in this subject excite me, surprise me, delight me; and I make sure I include those in the course. Teachers have the opportunity to expose students to the biggest and best ideas that have been discovered throughout time, ideas that inspire.

Pastimes are fun when they present a challenge that can be mastered. The sense of accomplishment derived by learning and improving a skill drives people to excel, whether it is sports, chess, medicine, engineering, or playing a musical instrument. I usually teach classes with laboratories in which students learn skills that can potentially be lucrative in the job market. That pragmatic feature sometimes makes the student enroll in the class, but learning how to do something new and seeing real skill improvement throughout the semester is what excites them. I teaching mapping and my students learn about how to use a Global Positioning System (GPS) receiver to make maps. Their understanding transitions from “it sits on my dashboard and tells me where to go” to an understanding of how a GPS works and what it’s really doing. This is specialized knowledge, and many of them develop some pride from it. I try to make my courses fun, which does not diminish the seriousness of the material. To me, fun doesn’t necessarily mean something is light-hearted or lacking in gravity. Sports are fun but sports are often very serious. Play is just practice for real life, and the more engaged a student is with the subject, the more learning takes place. Doing is learning. Knowledge comes in through the fingers.

Our educational system rewards right answers and punishes wrong answers. It seems it could not be otherwise; how could we possibly want our students to have flawed knowledge and misunderstandings?
It’s not sensible to give credit for wrong answers on a test or homework. Yet, I believe that learning takes place in the mistakes much more than in the successes. If a student tries to do something and makes a mistake, then the mistake can be corrected and, more importantly, the student actually tried. In fact, I want my students to make mistakes. I want them to wrestle the material, and engage with it boldly, and thus they will make mistakes: big ones, lots of them, as many as possible. Of course, in the end, they must understand what they need to know, but the process of making mistakes gives them the understanding of why an answer is correct, not simply that it is correct, because they know what is not correct. To this end, I allow my students to re-submit homework if the class is small enough for this to be practical. Few people can perform a complicated task correctly the first time they try it. Repetition and incremental correction are needed before any real depth is possible, so I try to provide a safe, non-threatening environment where my students can explore without the emanate threat of penalty if they don’t succeed the first time. It’s easier to learn with training wheels, at first.

I believe that until a question makes room there is no place for the answer. A disconnected fact is mental noise even if an authority assures the student that the fact is important. I sometimes begin a class with a question that is puzzling, challenging, maybe even seemingly nonsensical like “what is the shape of time?” I don’t answer the question right away. I build up to it like a story so that the student gets a feeling of revelation at the end, like they discovered something mysterious or have been let in on a secret. Better still is when the students ask the questions, so I engage my students in conversation during class. This means I have to learn their names, a luxury I can afford because my largest class has only 60 students. If I can get the students to work out the material with me barely coaxing them along, then they owned the process and made a discovery instead of simply absorbing information. In fact, I believe that a lecture consisting of only factual recitation is almost useless. PowerPoint slides of bulleted text might be good for reference material but not so much for comprehension. The learner needs to know why the information about to be delivered matters and is worth knowing. This can be very challenging. How does one explain why a subject is important when the student might not have even the vaguest idea about the subject; how to justify relevance when the topic is outside the student’s major field-of-study? But every field has its history and therein can be found its justification, why people found the field fascinating and useful. In my experience, it’s easier to spark interest from these stories than to try to convince someone of value. The students decide afterwards if the information has value to them, and my saying that it does will not make it so.

Stories are powerful. I teach about Earth’s gravity field and how it determines sea level. I motivate the explanation by telling the story of the building of the Panama Canal in which it was confirmed that the Pacific Ocean is not at the same height as the Atlantic Ocean. It seems that is an absurd proposition because water seeks its own level, and yet, it is true. The building of the Panama Canal is a fascinating, storied saga involving intriguing historical figures, some obscure, some well-known. The story resonates because the Canal is exotic and it still plays a vital role in international commerce. Everything taught at a university is the product of fascinating lives and exciting stories that can be told in the classroom. I can sometimes enliven a story with a personal note, which can be even more engaging than stories from history. When I can tell the story from first person, the students get a sense of The Possible. After all, here’s a person they know who really did something they aspire to do, too, and that person is teaching them how to do it. Personal stories can be poignant and funny; they can even put a human face on a topic as abstract as the mathematical theory of map projections. Stories can tell us why something is important and do so in a form more digestible than lecture. Biblical parables still resonate. Aesop’s fables remain
relevant. To learn storytelling I watched my favorite performers and teachers to see how they tell stories, and two common themes emerged: humor and pictures.

Pictures are powerful. I strive to explain with pictures because a well-drawn figure will often clarify much better than any other description. I use PowerPoint more as a high-functioning slide show than anything else. PowerPoint’s animations can give drama to a presentation through limited and paced reveals. Slide sequences can add image layers one at a time to build up to a final complete picture that would be too complicated at first to be understood in whole. I use photographs when possible and appropriate, and I create my own images with drawing programs like Corel Draw and computational environments like Mathematica. Mathematica lets me create complicated images I can manipulate during class, like rotating and rescaling three-dimensional objects to highlight features of interest. But I use these methods for images that are too complicated to produce in class. I prefer to draw pictures on the whiteboard for several reasons. Drawing gives a student time to copy the image because it appears relatively slowly, stroke-by-stroke. I can expound on the concept as I draw the image, so the idea emerges simultaneously with its picture, which can reinforce the lesson vividly. If I show a picture in PowerPoint, then students just look at it, but if I draw the picture, the students draw it, too. Drawing the picture requires the student to think about it at least enough to draw it; but the student often draws, and then stops to look at the picture, and then wonders what it means. The picture can create the question that makes room for the answer. Truth is, I could benefit from some instruction by my good colleagues in fine arts – my drawings aren’t very skillful. But, I can exaggerate my terrible rendering to poke fun at myself and thereby inject some humor into the presentation.

Classroom humor can make almost any subject bearable. Some topics are more interesting than others. When I notice the class has drifted away, I transition without warning into a story with a punch line. My favorites are chicken jokes. I find chickens innately comical, and interrupting a technical discussion with something totally absurd really wakes up the class. I use chicken questions in my exams in an attempt to lessen the stress level a bit. I know a lot of my students remember the chicken jokes even if they remember nothing else. They stop me in the hall and want to know if they are any new jokes. Students have given me numerous chicken gifts, chicken cards, and even one chicken poem. My personal experience is that I generally remember talks with humor in them far better than otherwise. Jokes add to the surprise the students experience in the class, and they can build a comradery, a shared “in joke” among students who took the class.

Empty time in the class is important. When I first introduce a concept I often pause in silence and let the idea sink in a little. Watching their faces, I can see when the students’ minds move from transcription-mode to contemplation where they stay until they’re ready for more. I use whiteboard-erasing time to provide a little silence, a little empty space, where the students know I won’t be saying anything or even looking at them for a few moments, which lets them do whatever they need to do right then – another white-board advantage. I strongly encourage my students to come to me personally with questions, but I try not to simply give them the answer again because hearing the answer again isn’t likely to help. Instead, I start a conversation to try to discover their misconception, correct it, and then give them a simple practice problem for them to try right there. And I wait in silence for them to work it. Once I had a student lock on to such a problem with astonishing concentration – her forehead literally broke out in a sweat. She wrestled with that problem for twenty minutes during which time I sat silently, actively doing nothing. Actually, I was supporting her silently by paying attention to the process, remaining engaged, but
letting her do the work. And, she got it. She looked at her work twice to make sure it was right, and then
looked at me for confirmation, and I just smiled. Then the realization of her understanding poured over
her and she stood up and walked away, her face beaming. I am convinced that if I had gotten bored,
started checking email, or gone back to my work, then the bubble would have burst and moment would
have been lost. Knowing what not to say can be as important as knowing what one should say. Not
teaching is part of teaching.

I would rather my students learn a little well rather than a lot poorly. A famous mathematics professor
named R. L. Moore (1882-1974) pioneered a teaching method famous for producing students who had
relatively small exposure to the field of mathematics at large but who were extraordinarily good at doing
mathematics, doing proofs. I took a course taught using Moore’s method. The teacher handed out a thick
notebook on the first day that was full of theorems (a theorem is a proposition to be proved or disproved)
without the proofs. The class consisted of us the students working out all the proofs on the board up in
front of the class after trying them first as homework – no book, no lectures, just a couple of pointed
explanations here and there. The teacher explained, “Heretofore, all your mathematics courses had been
like a track coach sitting the team in the bleachers and having the team watch him run laps until the day of
the big race comes. But, in this course, the team is out on the track from day one. Who wants to do the
next proof?” Indeed, that course did not cover as much ground as would have a lecture-based course but I
learned how to do a proof, and that made this class perhaps the most valuable math course I have taken. In
my own classroom I try to wait until the class grasps the concept at hand before moving on. In some cases
I have trimmed away major portions of the syllabus to make time to linger over topics that were
particularly difficult for that year’s students. If I didn’t cover all the material, I did not worry too much. If
the fire was set properly, it will find its own fuel in the future.