BELIEFS ABOUT TEACHING AND LEARNING

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KNOWLEDGE, BEAUTY & EPISTEMOLOGY

I teach System Dynamics. While I want my students to have some knowledge of system dynamics, most of all I want them to be excited and stimulated by it. I also want them to find it beautiful: I want to teach in such a way that my students find some aspect of beauty in the work, whether it's through the visual arcs in the model interface, or the precision of algebra in the way we write statements, or the way that system dynamics can ameliorate a social ill that concerns them. I want my students to somehow feel a sense of peace and beauty derived from some aspect of the knowledge I am teaching.

When a student walks out of my class, I hope to have imprinted certain metaphors or ways of understanding the world that will live on with them in ways they never would have expected. When a student walks into my class, I hope that they feel happy and that they have some anticipation about what they are about to learn.

How does relating to knowledge in this way benefit the student and the world? I believe that if students find something beautiful, rhythmic or stimulating in the work, this ultimately will develop their "voice" and help them get a job where they are most happy and therefore most effective in society. If my students have experienced beauty in what I teach I believe that they will succeed in future system dynamics courses because they will have felt passion. I also believe that if students can find beauty in the form of stimulation by knowledge that they will live more meaningful lives because their personality and their sense of value will be better aligned with their work.

To achieve this, I try to communicate the beauty that I find in the subject myself, for example, I have created an entire class devoted to visual attractiveness in modelling. For me, part of the thrill of system dynamics modelling is simply the geometric shapes. By appreciating these shapes as purely beautiful figures I have discovered new ways of relating to system dynamics models and the information they contain, for example, staring at patterns in models is how the idea and phrase 'social syntax' emerged for me. I would hope for my students to have similar epiphanies and I try to open my classroom to be accessible for all types of learners and all ways of orienting to the knowledge being offered. Things don't need to make immediate sense in order to be of value, for example, sometimes there is a value in just seeing without trying to comprehend.

I like to start my classes with a learning-styles questionnaire (1,2). In this way my students get to know their strengths and their natural orientation to knowledge. As a student it is important to know what opens you as student, just as it is important for me as a professor to know what opens my students. Knowledge must not be presented in a way that is intimidating or puts up walls. By beginning with a learning-style questionnaire I can come to know my students as they come know themselves. While certain students might not be immediate-

ly "suited" to the discipline of system dynamics, I believe that creating awareness of strengths in learning can enhance the discipline itself. For instance, a primarily visual student may not appear to be good at the math skills required for system dynamics, however, the student's visual orientation could really enhance the scope of models that are being published and communicated.

I also like to punctuate my lectures with stimulating questions. This gives students of all learning styles the space to breathe, refresh and reflect. For example, I will seed my lecture with moments for reflection by asking somewhat rhetorical and philosophical questions such as, *Are all types of analysis simply a form of problem definition?* or, *Are all good policies just common sense?* These are the sorts of epistemological questions that used to catch me up as a student: I'd be working late at night on a paper or project and become so close to the work that it would lose meaning.

So, another aspect of my strategy in seeding my lecture with these sorts of questions is to elicit that sort of thinking in a public or classroom context. I've found that when such uncertainty or disbelief is brought up explicitly in class, rather than laying latent, that it is easier to work through. It also gives students a chance to learn from their peers who often offer great practical advice for working through existential dilemmas in coursework. I can remember one student saying, 'I know what you mean, if you think about it too much, it just all seems like common sense! What you need to do is take note of what you knew about a problem before you entered the class and then notice how your understanding of the problem has been transformed. That's the only way you can understand the meaning without driving yourself mad.' Peer sympathy is an important aspect of contextualization and socialization in my classes and I find that encouraging this helps to create a learning environment in which there are opportunities to really appreciate the subject matter for the innate beauty within. Sometimes it is in knowing the limitations of a thing that we can really come to understand its value.

SKILLS What about skills? Classes are most often taken to serve a purpose. Yet there are grains in any discipline that can be applied elsewhere. System Dynamics is no exception. I believe that skills must be taught and enacted in a variety of ways in the classroom so that they can be applied in both the intended real world settings and also in unintended ways. I believe knowledge should be taught so that students develop skills for drawing upon the knowledge in different settings, some of which might be intended and others unintended. I have created in-class group activities to reify this idea, for example, an activity in which students interact with one another in class to tackle a real world problem of their choosing. In addition, students are invited to reflect on their attitudes to both group work and the subject itself, reinforcing the context and knowledge in a new and different way through the process of self-reflection.

I also try to teach and evaluate in an extremely simple way so that the knowledge taught is easily accessible to students. Quizzes ping the brain. And speaking activates different types of memory, including muscle memory, and even addresses mundane skills like learning not to say "um" all the time. If students don't practice the skill of communicating the knowledge they learn, it will not serve them optimally in the real world. By incorporating quizzes to ping the brain and spoken assignments, I think I enhance the course material by testing it in simple and instinctive ways, rather than through elaborate projects. I find that simple evaluation is excellent preparation for students to go into interview settings and I consider having one's brain 'pinged' to be a necessary part of professional development.

CONTEXT

On a different but related note, I always include letter-writing assignments in my courses with the hope that one or two of the students will even send the letters. It is so important to me that what I teach is rooted in reality as much as possible and that my classroom only serves as an incubator for knowledge, a sort of practice-room. Real life is always a performance and we need to practice performing - like anything else - if we are going to be good at it.

I remember in my Grade 5 American history class, my teacher asked us to write a letter to our grandparents asking them to write back to us with some stories from their past. History really came alive! The variety of things that our grandparents reflected on was astonishing, from being attacked by submarines in the war, to eating apple pie, to meeting cannibals in Peru while on a mining mission. Some even sent pictures to complement their letters. To this day I still have that letter from my grandfather, and it is a beautiful hand-written object. That Grade 5 teacher sure taught us more than a thin slice of American history by contextualizing our course in this way: she taught us the value of relationships with the outside world and the beauty of communication and of story-telling.

ACCESSIBILITY

Classrooms are rich with opportunities for all types of learning. I believe that the best learning takes place when we fuse the curriculum with many learning modes. As mentioned, while I sometimes get my students to memorize and recite, for example to pass my quizzes, I also get them to practice these recitations in the form of 'elevator speeches' on the topic or in mock interviews with other students. My experience is that it's effective to nest different types of learning into one another. For example, when my Grade 5 history teacher got us to write letters to our grandparents she taught us the value of family history, something that wasn't on the curriculum, but something that made the curriculum more accessible and softened the entryway for student engagement. The fact that the assignment wasn't directly

related to the hard-core course material made it less intimidating and more fun. Accessibility is one of my core teaching values and, best of all, it is often achieved simply through finding ways to make learning fun, engaging or enjoyable.

So, these are my values, and this is my pedagogical philosophy: knowledge and epistemology, skills, contextualization, accessibility, and finding beauty. At least if I aspire to this I know that I will enjoy my job, and that is half the battle.

CONCLUSION

I originally wrote this essay for a *Seminar in College Teaching* offered by *Colleges of the Worcester Consortium* in order to fill the final credits in my MSc degree. Typically my program (System Dynamics, WPI) has a class called 'Real World System Dynamics' to fill this credit. I thought that one essential 'real world' manifestation of system dynamics is the way that it is taught. I also thought it relevant to investigate how people might best learn the principles of this field.

Every field has its own epistemology- way of knowing- which characterizes the subject matter itself. In the seminar I learned that in any field it is important to articulate your beliefs about teaching and learning in the context of that field.

NOTES

(1) The Paragon Learning Style Inventory (PLSI)
http://www.oswego.edu/plsi/index.html
(2) VARK learning Questionaire. http://www.vark-learn.com/