

Jim Richardson
Statement of Teaching Philosophy

It is perhaps best to start a statement of my teaching philosophy with a quote that I feel is fundamental to teaching. The quote is “If you can't explain it to a six year old, you don't really understand it.”, the source is unknown though thought to be attributed to physicist Richard Feynman. The first step in being a good teacher is to know the material you are teaching back to front. Not only should an instructor have an understanding of each idea being taught but also have a deeper understanding of each idea in its *simplest form*, at the level at which it was first conceived.

The instructor should reflect this in his/her teaching by having a wealth of examples at the ready, both to motivate a subject area and to explain a single idea. Examples should be drawn from something in the real world that everyone is comfortable with. Mathematics is then seen not as a series of formulas but as something used to study the real world and it becomes more familiar and less abstract. For example, velocity and position are familiar ideas and most people already have a physical intuition about them that can be drawn on when introducing the idea of a derivative. At some level mathematics is all about moving from abstract ideas to concrete examples and just as importantly from concrete examples to abstract ideas. For many people it is intuitively clear that a car that travels 100km in an hour must have been going 100km/hr at some point in the journey – once we abstract this it becomes the Mean Value Theorem. The goal here is to encourage thinking. A good teacher will do this in such a way that by the time the statement of the Mean Value Theorem comes, the class will feel they have known it all along.

Creating an environment that is conducive to thinking is essential to teaching. In my experience I have often come up with a solution to a problem while going for a bike ride, or on the way to a friend's house. I feel this is because my mind is relaxed at this point, I am not working on the problem, there is no pressure to get it done and my brain is free to wander. A mathematics course cannot consist entirely of bike rides but nevertheless I feel it is important to set a comfortable and relaxed tone early on. An instructor should be friendly and approachable and should aim to create an environment where students are there not because they have to be but because they want to learn new things. It is necessary to stick to the course material but there is no harm in briefly mentioning related ideas that are outside of the syllabus and this can help to create such an environment. One of my best lecturers in my first year used to mention things outside the course simply by saying, for example, “Google the Banach Tarski paradox”. One lecture he even went as far as recommend the fantasy novel series “Diskworld” written by Terry Pratchett. An instructor's role cannot be underestimated here, he/she already know what the interesting ideas and theorems are and must act as a guide for students as they explore the world of mathematics.

Mathematics can only be learned by doing it. This is the goal of assignments and they are such an important part of teaching that they deserve their own paragraph. Mathematics is difficult and students should be expected to work hard at assignments. Again the instructor's role here cannot be underestimated. The instructor already has an idea which problems are hard, which are easy, which are interesting and which are merely computations and a good assignment will consist of a mix of all of these. Working on assignment questions is where most of the learning happens and a lot of

thought should be put into the questions that are chosen. Even at a first year level proof questions should always be included. A formula becomes infinitely easier to remember once you know why it is true and if you prove it yourself, no matter the level of rigor, it will remain in your mind for longer and you will feel a deep sense of satisfaction. Again the goal here is to encourage thinking, and much like the lectures a question can be included at the end of an assignment which is simply “Google this”. This can even be worth some marks and it will make the assignment more interesting and help keep the tone of the class relaxed. Lectures, for the most part, are a one-way form of communication and assignments can serve the greater purposes of developing the student-teacher relationship, a key ingredient in teaching.

An instructor can have the most interesting course material in the world but the students will not learn if mutual respect is not established early on. This is crucial to teaching. I expect my students to show me respect by coming to class on time, listening during lectures, finishing assignments on time, making an effort to learn the material and attempting problems before coming to me for help. In return I will show my students respect; I will spend time preparing my lectures, I will make sure my board work is self-contained, neat, structured and concise, I will ensure I am speaking loudly and clearly enough, I will put effort into creating assignment and exams. I will make sure the syllabus, grading scheme and office hours are well established from the beginning of the course and I will make every effort to help students outside of lectures. Mutual respect is key to any relationship and critical to setting up a good teaching environment. Students at university are there to learn and they expect to be taught. If not they are in the wrong place.

I feel it is appropriate to conclude my teaching philosophy with another quote, this time from director Martin Scorsese. “Cinema is a matter of what's in the frame and what's out.” To me he is saying that what is included in a film and what is left out is essential. The lectures should consist of ideas and while it is important to do computations and discuss technicalities this should not form the foundation of a lecture. Scorsese one of my favourite filmmakers and I think this is because he has thought a great deal about how to make a good film. Every scene in a film is important and everything about a film, from the soundtrack to the casting, contributes to the film overall.

Simply ensuring that students attend lectures and complete assignments is not enough to teach, just as burying a seed in the ground is not enough to grow a tree. An effort must be made to make students want to think about the material. In this respect the instructor is simply a gardener who wants to create the best environment for his seed. Everything the instructor does becomes important in creating this environment and nothing is above consideration.