Educational Philosophy

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Ever since I can remember, "doing Physics" has been my muse. That process of understanding mother natures' blueprint, describing her laws using the unreasonable effectiveness of mathematics, and experiencing the visceral joy of mastery, is what has been called the "the joy of finding things out". For me, this pleasure is only equaled, or exceeded, by sharing my passion with others and seeing them experience the same "Aha!" moments.

Traditional education, on the other hand, has emphasized the utilitarian aspect of knowledge: The application of the scientific method in a zero-sum game of "survival of the fittest" to suit the needs of mercenary armies, corporations, nations, and individuals. But this mode of thinking appears outdated and incongruent with the modern day omnipresent reality of global challenges caused by rising population levels and limited resources. My belief is that our ambivalence to this impending ecological singularity is caused by our insensitivity to our holistic essence and a belief in individualism above all else. It would be sad if the improbable achievements of the human intellect were lost through our poor stewardship of spaceship earth. We must ensure that the idea of a "global citizen", which is often equated with "globally functioning knowledge worker", is defined to include the responsibility of good stewardship of the earth and all its inhabitants. We need a more compassionate mindset and the most logical place to cultivate this broader consciousness of collective obligation is through education. If education were to provide this context then we might have more citizens with cooperative goals.

It would appear then, that the educational institutions that we experience earlier in life should emphasize the meaning and context of education - what we might call *meta-education*. This shift deemphasizes specific or standardized knowledge and sets the stage for life-long learning with a purpose. I believe that educators can take the first pragmatic steps to realize this goal by helping their students make connections between their subjects and the world around them. Unfortunately, there are aspects of this idea that seem to swim against the tide of conventional standardized education. I am optimistic that this one-size-fits all approach to education will eventually be overthrown when the benefits of personalized education are made cost-effective by the appropriate use of computers.

I like to teach Mathematical Physics, especially when there is a chance to help the student uncover deep theoretical insights and make connections between apparently unrelated topics. My favorite way to teach is through a guided discussion. The continuous dialogue helps me to understand the interests and thought processes of each student and adapt accordingly. The first task is always to get the students interested and motivated to take responsibility for their own learning. Through a Socratic discussion, with challenges to notions we take for granted, intuition is developed and misconceptions are corrected. The classroom should become a trusted community for learning how to formulate well-posed questions and critique solutions productively. I take the motto of the Royal Society, "Nullius in verba" ("Take nobody's word for it"), very seriously and encourage the acquisition of self-confidence and technical proficiency that comes from derivation of facts.

My dream is to modernize Physics teaching in several respects. First, by taking a less historical and more fundamental route while at the same time not diminishing the human aspect of the endeavor and the importance of context. This may provide opportunities for curriculum reduction by emphasizing connections, unity, and deeper principles. Second, by introducing students to the mathematical tools that have become important such as Group Theory, Lie Algebras and Geometric Algebra. Thirdly, by using computers to accelerate and personalize learning so that we work toward mastery. However, like all students I will need to be humble and realize that I will have a lot to learn myself from my students and my colleagues.