Teaching Philosophy

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My teaching is driven by three approaches: argumentation, active learning, and intrinsic motivation pedagogy.

Argumentation:

"Scientists are manipulating the data," blares one headline, and a political figure shouts from a podium, "Climate change is a hoax!" In my class on biodiversity and climate change, I play the devil's advocate. I show my students a graph with purported "data" that support that climate change indeed is a hoax. The students shift uncomfortably; now they must engage in the controversy by initially disagreeing with their professor. Having put them in pairs for this exercise, each group is given a handout with data from the ice cores of Antarctica and easily digestible additional information to help them understand how to analyze the ice core data to support climate change. Lastly, using this analysis they must formulate a supported argument to convince me of the validity of climate change. In this media-intense world where facts are not essential and where science and pseudo-science are on the same stage, it is essential that students be taught to question what they read and be able to decipher the evidence (or lack thereof) of these claims. Whether it is my class on genetics, immunology, evolution or climate change, throughout the semester students are challenged to analyze and critique the scientific literature and formulate their own questions. Jonathan Osborne's 2010 paper titled "Arguing to Learn in Science: The Role of Collaborative, Critical Discourse" is a call to use argumentation (a pedagogy requiring students to construct and evaluate scientific arguments and to reason scientifically) in the STEM classroom. This pedagogy is at the core of my classroom teaching. Urging students to question and explore scientific data literature from all angles by themselves is an essential skill that I hope to teach science and non-science majors. With this skill in hand, they can determine the validity of the "scientific" claims that bombard them in their everyday lives.

Active learning:

With an umbrella in hand, I enter the classroom. No, it is not raining, but I have a letter from a person who spent her life researching umbrellas and now would like to make this study a natural science, called "Umbrellology." In small groups, the students debate among themselves to determine whether or not this is a valid request. My undergraduate learning assistant and I move about the room to facilitate these discussions. I then open up to a floor discussion, with the groups presenting their ideas about the question, why not umbrellology? They learn quickly that natural science is inquiry into the natural world around them and proposed explanations based on evidence. Next, I challenge their new definition of "natural science" by showing a video of researchers collecting evidence in an old house with gadgets detecting ghosts. I ask if this ghost hunting is science. Through these activities, they learn the basics of inquiry into the natural world. In a seminal article, Richard Hake's seminal paper showed that when lecturers paused and asked students to discuss the concept being presented in pairs or small groups, students achieved an average gain of 48% in pre- and post-tests of knowledge as compared to the 25% gain of pre- and post-tests of knowledge with a traditional straight lecture. All my lectures are punctuated with group questions, discussions, debates, and other creative learning activities to bolster the students' learning experience.

Intrinsic motivation

Their hands tentatively touch the rough, bumpy bark of the hackberry tree, they gently peel off a piece of shiny bark from the river birch tree, they sniff the aromatic crushed leaves of a sassafras tree. Awakening the students' senses by immersion in nature, whether it be a walk on our campus or a hike into the lush tropical rainforest of Australia, fuels their curiosity. In turn, this curiosity taps into the students' intrinsic motivation to strive to understand how this biodiversity evolved, how the ecological forces maintain and change biodiversity, and how to conserve biodiversity. In addition, it has been shown by Walker C. et al. that students will persist when presented with challenging academics and will exhibit higher academic achievement if they are intrinsically motivated. I find this to be true in the sense that, my students are more willing to tackle difficult analysis of large data sets on forest regeneration or phenology if they understand firsthand the relevance of the analysis.

I encourage them to think of the societal ramifications of taking biodiversity for granted. Our world is changing rapidly, and we need a new generation of students aware of the ramifications of climate change and for them to take action. There is a quote that I present to all my classes that I think best sums up my approach to learning:

> In the end,
> We will conserve only what we love
> We will love only what we understand
> We will understand only what we study (Baba Dioum,1968)[1]

[1]Valenti, JoAnn M., and Gaugau Tavana. 2005. "Report: Continuing Science Education for Environmental Journalists and Science Writers (In Situ With the Experts)." Science Communication 27 (2), 300–10.

Citations
Hake, Richard. 1998. "Interactive-Engagement Versus Traditional Methods: A Six-Thousand-Student Survey of Mechanics Test Data for Introductory Physics Courses." American Journal of Physics 66, 64.
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