Teaching Philosophy - Sven Schmitz

The Education Equation: $E = mc^2$ - Education = material x care x connect

The goal for me is to educate the next generation of aerodynamics engineers for the aerospace & wind energy industry, academia, and national agencies such as NASA and DoE. In order to achieve this goal, I use a number of strategies inside/outside the classroom to promote student learning; these student-centered strategies (care x connect) work best when the professor's role is that of a peer & mentor who cares about them learning and who connects them with the course material as it is relevant to aerospace research and applications. I have found that the key to successful student learning (Education =) is the product, and not the sum, of material, care, and connect; hence the education equation $E = mc^2$.

"Clear & concise expectation" (material): The course syllabus is a clear & concise description of the learning objectives, expectations, assignment dates, grade breakdown, available office hours, etc. Teaching one of our large required junior courses (in an ABET accredited program), a clear & concise (though dry) factual document is a 'go to' resource for my students for the entire semester.

"When I was a student I had a difficult time with concept Y …" (care x connect): In the classroom, I often reflect back on myself being a student again and having difficulties grasping a certain concept. I have found that this (at times humorous) reflection encourages & engages students to participate in class. It has always amazed me how much of a 'safe space' this creates in which students feel comfortable asking fundamental questions about the course material.

"Follow the book somewhat … but not entirely" (material): I want my students to become creative & critical thinkers. Finding more than one (textbook) solution to a given problem has a big impact on student learning. Giving students a variety of solutions and material resources (text book, posting notes online, providing additional examples/resources) addresses different types of learners and encourages a creative approach to problem solving.

"Learning by communicating effectively with each other" (care x connect): My office hours are a hybrid approach of individual conversations with students and open conversations where I invite students to write on the blackboard (or screen sharing remotely). It is not uncommon that 15-30 students attend office hours where we 'talk' about lecture material and homework questions. I often summarize the questions & conversations in the following class period.

"Flip the classroom or don't flip the classroom …" (material): I adapt my teaching as I see need. If common questions are asked during office hours or via email, I make sure that concepts are repeated/communicated again in class. This sometimes includes e.g. hints to a specific homework problem or a 5-10 minutes Q&A. In the end, a particular class period may end up being full lecture or more focused on application and problem solving.

"The right mix of assessments" (material x care): I use a blend of quizzes to assess concepts, homework assignments consisting of problem solving and open-ended questions, and clear comprehensive exams with sufficient time to complete. Students also appreciate review sessions and that I post notes regularly. I found that dropping the respective lowest quiz and homework score helped relieve some stress.

"Look what you can do with what you learn" (material x connect): I constantly share aspects of my research with undergraduate students in class. It sparks their motivation and curiosity, gets them interested in independent research and senior research theses. Students love to see how 'dry concepts & theory' gets applied to situations that they could not have imagined before.