

## **Teaching in Computer Engineering, A Partnership with the Student**

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My own best teachers have shown me that teaching is a process in three steps: presentation of the knowledge, useful application of that knowledge, and integration of new knowledge into the student's larger body of experience. Good teaching makes the process effective, even enjoyable. Its goal is the student's increasing mastery and self-reliance within the field of computer engineering.

The initial phase, presentation, is mostly up to me as a teacher. My first responsibility in this phase is to engage the students' interest. This is where I share my excitement about the field, and show the technical, professional, and social importance of the knowledge. This is also when the student must agree, consciously or not, to work as hard at absorbing the material as I do at presenting it. Lectures, readings, case studies, demonstrations, etc. are important at this step, but are only tools. To be effective, I must adjust my use of these tools to each class, sometimes to each student with whom they are used. The most rewarding moments in this phase come when students explore beyond the syllabus on their own, and start to ask for more. It can mean hard work on my part, preparing new course content in response to student demand, but I use my effort to demonstrate to the students the importance of their involvement. The same is true if some student needs extra, individual support. I hope that my personal attention and encouragement will reinforce that student's sense of involvement in the process.

The second phase, application, requires more balance and dialog between teacher and student, or between students. This is where students put their knowledge to use in solo assignments, group projects, lab exercises, or open discussion. This is also where students start to make the knowledge their own. Practical exercises should reinforce the knowledge as the student considers the issues again and again, examining many their possible meanings in the context of a desired outcome. Practice also involves recognizing the mistakes and wrong turns that define the limits of the new knowledge. Team work and debates give students more opportunities to see different interpretations, good and bad, of the course material. At this stage, my job as a teacher is to facilitate and to correct while the student tries out new skills.

The third step in the teaching process is very much the student's job. This is the point at which the isolated facts of the course content become working parts of the student's intellectual vocabulary. More than just knowing facts, the student must weigh them against each other and against each new context in which they might apply. The student must combine new and existing knowledge in order to answer new questions, and to interpret the outcomes that result from tests of that knowledge. At this stage, a teacher's job is more collegial, to suggest additional relationships worth exploring and occasionally to make sure that students appreciate the significance of their successes. This is my real goal as a teacher, to see a student demonstrate not just knowledge but judgment.

The other half of my partnership with my students is my duty to learn from them. I have to admit that I have made mistakes as a teacher, in presenting material, in creating opportunities to use that knowledge, and elsewhere. My job is to recognize my errors when I make them, to correct them, and to replace them with practices that work. Teaching is a serious responsibility and an important intervention in a student's life. I take it seriously, and I want very much to become increasingly effective as a teacher. Although it's a serious duty, I never want it to become grim. One serious measure of success as a teacher is the pleasure and even fun in it, for me and for my students.