One of the most important aspects of engineering education is instilling in students the ability to truly integrate theory with practical applications. Without practical applications, theory is interesting but of limited value to practicing engineers; without theory, the ability to practice engineering is severely limited by the inability to organize known facts and use them in new circumstances. A student who understands both the basis of the material they learn and how to apply that material to realistic problems will have a sound foundation for later work. This integration between theory and practice can be difficult for many students, and enabling them to make this link is my primary goal as an instructor.

The appropriate mix of theory and practice will vary from one course to another, and different students will gravitate towards different aspects of the material, depending on their skills, personality, and learning style. I have observed these differences between students in several CAD courses I taught at a community college. By nature of the classes, they focused much more heavily on practice than on theory, although I did augment the classes with information on design intent and how it influences the way in which a task can be approached. Some students found this material very helpful, particularly those who preferred to be self-directed in their work. Others focused their attention on simply achieving a high level of skill in the mechanics of the CAD software. In university courses, I would naturally include much more theory in a class, but it would still be tied into practical applications of that theory. For example, in teaching a class in control systems, I would use simple demonstrations and case studies to help students understand the key concepts and major issues, such as the benefits and limitations of certain types of controllers, both in a theoretical sense and based on practical details of implementation.

In addition to integrating theory and practice within a course, students need to learn how their various courses can be integrated together, and therefore a second goal of mine is to show how the material learned in my course fits into a larger framework. In some cases, students can readily see that the material for one class is tied to other areas of engineering. In other cases, however, students may not readily perceive how the material from one course could be applicable in other contexts. For example, as an undergraduate student I took a course in measurements, which I felt at the time was unnecessary. It wasn't until much later, when I drew on that material to design inspection stations in automated machinery, that I realized how useful it was in my profession. By pulling in these types of real examples of applications, I can enrich my students' understanding of what they are learning.

I follow several principles in teaching the course material. One thing that I feel is essential in any class is that the instructor should have and communicate a clear sense of direction for the course. In support of that, I have always started off each class session I taught with a brief reminder of the previous session's material, an outline of that day's material, and a reference back to the course objectives in the syllabus. I use demonstrations to introduce new concepts wherever possible, either through computer simulation or physical examples, and I feel very strongly that well-designed labs need to

be included in a student's engineering education. In addition, project work is extremely useful in the integration and use of the various concepts presented. In my CAD courses, each student completed a 3D model of either a collection of simple parts for a mechanism or a single complex shape, and these were actually made on a stereolithography machine. I found that the open-ended nature of this assignment allowed students to draw on their own strengths, whether technical or artistic, and enhanced their interest in the course. Furthermore, with several students from foreign backgrounds, this assignment allowed them to share something of their traditions with the rest of the class by including an artistic motif from their culture, either as the focus of their project or as an enhancement to the base of a simple mechanism. Having observed the benefits of this type of assignment, I intend to include creative assignments in my classes whenever possible. I see this as particularly important in the upper-level classes, where students should be learning to be independent as scholars and as engineers.

In order to measure the success of my students, and my own success as an instructor, I use a variety of assessment methods. In some classes, regular homework assignments provide a useful way to evaluate students' progress. Tests are also useful, though they must be carefully written to ensure that they are clearly worded and appropriate in length and difficulty. In addition, they need to be written so that they only test the material that is intended to be tested. One teacher I know wrote an otherwise excellent exam question which exemplifies this point. He had attempted to tie probability theory to concrete reality through a problem dealing with the various permutations of a baseball team winning the World Series in seven games. A brilliant young woman with a good understanding of the material couldn't solve the problem, since she had no idea what a "best of seven" series was - in particular, that they only play all seven games if needed. In a diverse student population, this type of situation is a potential pitfall that instructors need to be aware of when constructing problems for a test. Also, some students "freeze" on tests and fail to demonstrate what they have learned. For these students, projects and presentations can give a better assessment of their capabilities and knowledge. In my previous teaching experience, I've used a combination of tests, homework, and a project, and find that this works well. Students receive prompt feedback via homework, which covers the more theoretical aspects of the material; have the opportunity to demonstrate that they've learned from that feedback on the tests; and can use the project to synthesize what they've learned and work on something with a practical aspect that appeals to them. By looking at the overall picture of how the students are doing in the class, I can evaluate my effectiveness and make any necessary adjustments. If a few students are doing poorly, then they may lack background or need tutoring; if a large number of students are failing to master the material, then I would need to make changes, either to the way material is presented or to the level at which it is taught.

Teaching is a very challenging endeavor, but it is also very rewarding. Seeing students truly grasp the meaning of the material, how it relates to other courses, and how it can be used in practical applications, is one of the most exciting parts of being an instructor. By accomplishing these things, I can help my students become talented, creative, and effective engineers.