

My Teaching Philosophy

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1. Introduction

I believe that part of my vocation is to be a teacher, therefore I view my contributions to the education of students not as a job but as a part of my life. My job description lists my responsibilities as 50% teaching, 50% research, plus service, but it is because of the teaching and the service that I left industry for academia. In my view, “teaching” encompasses not only what goes on inside the classroom but all things that add to the students’ learning experience, and my teaching philosophy reflects that view. I believe that most learning occurs outside of the classroom, and that the value that I can add to the student’s learning experience comes in many forms that are more important than traditional teacher-centered activities like lectures and discussions. My current teaching philosophy is based on my continuing study of teaching and learning and my relatively short tenure (5+ years) as an Engineering professor. My teaching philosophy is not static but is a work in progress, developing as I gain experience and experiment with different methods and techniques. I am aware of the contradiction between my philosophy and what most students think is good teaching, and I deal with student feedback and attitudes accordingly.

2. My favorite teaching rhetoric and quotes

- “You don’t teach subjects, you teach people.”
- “Everything should be made as simple as possible, but not simpler” (A. Einstein)
- “Do not assume responsibility for a student’s learning. That responsibility must lie squarely on the student to avoid subverting perhaps the most important single objective for college students: learning how to learn without supervision.”

3. My beliefs about teaching and anecdotes from pedagogical research

- The first step in being a good teacher is to be a good person, a caring human being - If you show enthusiasm for teaching and truly care for students they will respond and work hard for you.
- Out-of-class contact with faculty has been shown to improve student learning and development, and relationship is a key factor in retention (students with just 1 relationship with a faculty member are much more likely to stay with the program).
- Modern man is more apt to listen to a teacher who is first a witness...We teach what we are.
- Time-on-task is strongly correlated to the amount of learning.
- High expectations often lead to high achievement, but you must make the expectations clear and must provide adequate motivation.
- All learning is personal.
True learning is hard, and it takes a lot of personal effort to overcome the inertia of ignorance. Therefore, to be effective learning should be student-led whenever possible, with the professor providing feedback, assistance, focus, and motivation. Most actions that make things easier on the student (besides making expectations and assignments clear) do not enhance learning.
- Students must be discouraged from
 1. Doing exactly what the instructor says without thinking or wondering why.
 2. Doing things based on what they think the instructor wants rather than based on what they think needs to be done.
- Experience + Reflection = Learning
Not all experiences are good learning experiences - the “experience” must be well structured and promote good habits.

Without reflection, an experience is not necessarily a learning experience. Reflection must include writing and documentation of the experience, otherwise all work is “lost”

- Designing...in the broader sense in which all professional practice is designlike, must be learned by doing...A designlike practice is learnable but is not teachable by classroom methods. And when students are helped to learn design, the interventions most useful to them are more like coaching than teaching – as in a reflective practicum. (Schon, Educating the reflective practitioner,1987)
- Meaningful learning and especially learning how to learn is enhanced by talking with peers and preparing to teach others. A key to learning how to learn is to get students involved in the construction of knowledge representations (i.e. create knowledge bases or expert systems for their area of interest). However, it may not be possible to teach learning skills and problem-solving skills directly, perhaps they must emerge spontaneously as a result of experience. (K. Smith, Engineering Education, 2/1987)
- What students need to improve their efficiency in learning outside the classroom are highly interactive learning environments in which they receive feedback about their work immediately, while their interest is high. Ways to achieve this in practice include: 1) formal and informal problem sessions, 2) peer study groups, 3) one-on-one tutoring sessions / student-teacher conferences, 4) computer-aided instruction, 5) email between students and teacher, 6) hands-on projects that include taking things apart, putting things together, etc.
- Students learn best by "discovering" new information for themselves - a teacher's main role is to guide the discovery process.

4. Putting the philosophy into practice in Engineering Education

Some of the direct actions I take to put my teaching philosophy into practice are a) establishing a connection/relationship with students, b) creating effective learning experiences, c) creating an active and supportive learning environment, and d) Providing meaningful and prompt feedback on all student work and providing incentives for students to review and resubmit work until adequate performance is demonstrated.

a. Relationships with students

- Learn all student’s names and academic/professional goals
- Maintain an open door policy to be available to students as much as possible
- Make advising student groups and student projects a priority activity because of their potential for meaningful learning experiences
- Meet with all students individually at least once every quarter, and give them the opportunity during exam week to talk about any issues or concerns they have with the course.

b. Effective/Active Learning Experiences

- Spend majority of “teaching time” setting up good learning experiences, both for in-class and out-of-class. Design learning activities that help students make the best use of their time and efforts outside of the classroom, where most actual learning occurs. Students working on, completing, getting feedback on, and reflecting on learning experiences is the main learning opportunity.
- Important skills for engineering students to develop include: 1) Learning what to do when you need information, 2) Developing efficient ways to learn new skills, 3) Learning how to create good documentation of your work, 4) Learning how to work effectively both independently and in a group. To make sure these key skills are emphasized:
 1. Emphasize the learning process, not just the topic or material covered
 2. Structure class to encourage continuous learning / continuous improvement, not just covering material and completing tasks
 3. Require students to complete a "Resource file" for each course that forces them to collect and synthesize all notes and handouts and present them along with examples of correctly worked

- problems in a "user-friendly" format. They must demonstrate they can use the file to help them solve open-ended problems in that topic area.
4. Use real-world group projects
- c. Creating a supportive learning environment
- Take steps to establish a learning community in each class, including having students make short presentations about topics that interest them, establishing a course web site that allows instant communication between all students, creating lab/study/project groups early in the quarter and then meeting with each group during the first few weeks of class.
 - Emphasize that it is the students & teacher together against the material, rather than students against the teacher
- d. Prompt and meaningful feedback
- Use grading rubrics that are shared with students before assignments are due so expectations are clear and they have a chance to "self grade" before submitting the work.
 - Put a high priority on grading assignments quickly and providing lots of written feedback so they can learn from their mistakes, and set up a mastery learning grading scheme that effectively requires students to review and correct any work that contains significant errors until they can demonstrate acceptable performance.
 - Use face-to-face grading for key assignments to remove all mystery from the grading process and so students immediately see and get feedback on whether errors are due to misunderstanding, miscommunication, or inattention to detail.

Additional notes on teaching

Grading / Assessment / Fairness:

In all cases use a criterion-referenced grading scheme, without quotas or competition or curves.

Be very clear about expectations

Give students examples of previous quizzes/tests to alleviate some nervousness

Give students examples of good or excellent work for homework, projects, etc.

Try to explain to students what it will take to get an 'A' in the class, and also a 'B', 'C', and 'D'.

This list can be in terms of demonstrated skills as well as more subjective criteria such as learning skills.

Develop a grading scale or a scoring rubric for all major assignments and tests distribute it before the assignment or test. This is not a checklist for the student to follow but it should clearly convey the high expectations for B and A level work, and should be specific enough so that the grading decisions are made before rather than after the assignment is completed.

To reduce amount of grading,

- 1) use competency based tasking for some learning experiences – pass/fail, no partial credit, either you complete it acceptably or not
- 2) weekly pop quizzes, pick piece of paper out of hat with yes/no to decide whether or not there will be a quiz that day
- 3) Rather than grading all HW, pick a person to do problem on board and give credit based on just a few problems per person, but have all problems completed and documented in design notebook.
- 4) Give global grades rather than sub grades
- 5) Develop a code for comments commonly used

Good feedback should be

- 1) Descriptive and clear
- 2) specific (a few well designed comments rather than a sea of red ink)
- 3) directed toward behavior the student can do something about, but is closer to sharing insight rather than giving advice
- 4) well-timed (prompt)
- 5) solicited rather than imposed

Make sure that you always fully work the assignments before giving them to the students

Remember that students have ingrained opinions about what grades mean, and these cannot be changed but must be dealt with.

Thoughts on Examples:

In general, students want instructors to work more examples and to give problems similar to the examples for homework and quizzes because it is easier that way and because it makes them feel like they have learned something, when in fact it is likely that all they have learned is how to copy or repeat a certain procedure, not how to solve a problem.

Examples can be good early in the class for motivation – have students find 'Show & Tell' examples to illustrate certain sections or topics.

Projects

Derivative Projects – have 1 group do a modification or addition to another group's work, using design notebooks and other documentation from the 1st group's effort

Scheduling of tasks is critical and helps students.

Weekly Status Reports

Reinforce good features of proposals and presentations so all groups will model good features and shun the bad features

Show students a structured way to do risk assessment / risk analysis

Different types of projects:

1. High stress projects – time limited with short deadlines
2. Social task – focus on communication, setting goals, etc.
3. Term project to encompass entire objective of course

When possible provide a range of projects, some of which are required and some of which are optional. Allow students to select several projects or activities that most interest them from the optional ones.

Learning Community:

Add help files and summaries of key points to the course web site.

Have students post summaries of lectures or reading assignments

Have students post questions or areas of confusion, and email them to the instructor so that they can be reviewed in class.

Institute a system of peer mentoring