Teaching Philosophy of Mattox Beckman

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Philosophy

There are three foundational values that guide my teaching. The first is a profound belief in the value of an individual. Whether or not they realize it or act like it, my students are human beings who have dignity, value, potential, and much to give. A second belief is in the fundamental interconnectedness of all things. One area of knowledge will inform another and growth in any area of life will impact the whole. As a teacher it is my privilege to play a part in the process of my students' growth, and a joy to help them reach their own learning and career goals. The third belief is that with any gift comes responsibility, which applies to my own gifts as a teacher and to my students' gifts as students.

Objectives

There are four objectives that focus my efforts in teaching. I desire:

to train my students in the skills and knowledge of the subject matter.

to teach my students to see the beauty that is in computer science.
The ability to appreciate the beauty of computer science is important because—though surprising to many outside of this field—Computer Science has an intensely creative aspect. A proof, a program, or an algorithm requires not only knowledge, but emotional energy. Students who learn the mindset of a computer scientist and see their work as art consistently write programs that are more elegant, more reliable, and more rewarding to themselves.

to encourage my students to notice and ask about the wider applications of the material.
Observation and inquiry about the wider implications of the material is essential to learning. Facts can become knowledge only when the students understand the connections between them. Once the students have learned to ask questions themselves, they become active participants in the learning process, and become their own teachers.

to influence my students to develop a sense of personal and professional responsibility.
Most college-aged students are transitioning from adolescence to adulthood, from dependence to independence and interdependence. A key component of this transformation is the development of a strong sense of responsibility. The effects are most visible in emotional and relational contexts. Since teaching is a relational activity, this growth has a strong effect on both the outcome of the teaching and on the students as individuals.

Methods

Communicate Objectives I always give a list of objectives at the beginning of a lecture and for each assignment, stated from the point of view of the student.

Clearly stated objectives will

- structure the content of the course material. This enables the students to determine which statements should be recalled and understood, and which are given only as examples or explanations. Students seeing material for the first time may have difficulty distinguishing between them.

- enable the students to measure their own progress. Objectives communicate the expectations of the instructor, and show the students where to focus their efforts while learning. By reviewing the objectives after a lecture or assignment, they will know what material they have mastered and what needs further attention.
- communicate respect to the students. When we give a lecture we ask for an hour of the students' lives. By stating our objectives we tell them what we will give them in return. This helps the students to feel that the time is well spent, and that the assignments are more than just "busy work."
- ensure that all aspects of the course work together. Each component of the course will fit with the others, helping to reinforce concepts by demonstrating them in multiple contexts, and the exams will be an accurate measure of learning.

Assessment vs. Evaluation The Pacific Crest Institute has their own technical definition for these two words. An *evaluation* asks if a performance has met a certain standard. In the context of teaching this is usually an exam or assignment and results in a grade. In contrast, an *assessment* asks about the strengths a performance, and how it could be made stronger. I try to use assessments when giving feedback since they enable continuous improvement, regardless of ability. I often ask students to assess my lectures and assignments, and have found self-assessment to be valuable for my own performance as a teacher.

Grades Grades must reflect mastery of material. Even for a student who values learning for its own sake, the course grade is very important. It is a reward for hard work, and a key to advancement in the future. It is also a measure of how well the student met the expectations of the instructor.

I assign cutoffs at the beginning of the semester, and design my exams so that a student with a 'C' level of mastery will be able to gain enough points for a 'C', and that a student with an 'A' level of mastery will be able to gain enough points for an 'A'. This solves two chronic grading problems: grade inflation (a symptom of grades that are meaningless) and lack of feedback (a student is unable to judge how well or poorly he/she is doing until it is too late to change the outcome of the grade).

Connect Theory and Application. A theory that is not applied is quickly forgotten, and application without theory lacks depth. Motivating examples and assignments where key concepts are implemented are two of the ways that I emphasize application. Referring to recent research, explaining links between the current topic and higher level material, and discussing the historical development of the ideas are some of the ways I emphasize the theory.

Teach Students How to Learn. In order for students to truly master the material, they need to learn how to teach themselves. This skill is usually acquired toward the end of an undergraduate career. Methods I use to teach this include:

- giving "demonstration lectures" where I solve the homework set or write a small interpreter. I try to model the skills needed to complete the task, and think out loud to expose the reasoning process. This seems especially effective when I make an error and show the students how to find and correct it.
- answering a student's question by running an experiment, making an example on the spot. My hope is that the students will think, "I could have done that" and will have a strategy with which to approach future questions.

- using active learning techniques such as encouraging questioning during the lecture (even with more than 200 students) and solving sample problems during class.
- explaining the process of how we learn and how to overcome internal barriers to learning. Many students face "impostor syndrome" when they transition from high school to college. To encourage them, I often refer to the work of Dr. Carol Dweck (author of *Mindset*), whose research shows that intelligence and ability are not fixed attributes, but can be greatly increased with the right kind of effort.

Flipped Lectures I am currently experimenting with various forms of "flipped lectures." I have been posting voice-over slides to my web site, and using the meeting time to review the material, demonstrate concepts (especially through live programming), and give activities to the students. Initial results have been very encouraging so far. The students appreciate being able to review the lecture multiple times, and having them do activities during class helps them master the material more quickly.

Emphasize the Students' Responsibility Teaching the students how to teach themselves also helps them understand that they are the ones most responsible for their education and its outcome. I emphasize this in many areas. I expect my students to take responsibility for mistakes and to be proactive in addressing them. Regarding discussion group questions, students are encouraged to find the answer themselves and to report what they have tried. During lecture, I discuss how the concepts they are learning affect software engineering, and try to show the different consequences their engineering choices will have in light of the material they have learned.

Another area of responsibility is to society as a whole. As our nation debates issues of security, privacy, freedom, and dignity, our students will need to be ready to educate the public and policy-makers about how technology works so that they can make good and effective decisions.

It is frequently observed that people will meet the expectations you have for them, whether high or low. By communicating high expectations and support for my students, I hope to communicate respect and value for them, both as students and as human beings.