Reflections on 30+ Years of College Teaching

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ABSTRACT

It seems logical that if one does something for 30 years, continually gets paid for doing it, and even receives an award of recognition now and then, he must have learned something along the way that he can share with others following in his footsteps. This paper is an attempt to share the techniques, approaches, and practices that I have learned in the last 30 years to increase my effectiveness as a teacher. It is my hope that at least some readers will choose to adopt some of these techniques to increase their effectiveness, as well.

Categories and Subject Descriptors

Social and professional topics~Computing education.
Social and professional topics~Computer science education.
Social and professional topics~Adult education.

Keywords

college teaching; respecting the pupil; teaching techniques

1. "HOW DO YOU DO THAT?"

Like many senior faculty members, my Chair often asks me to sit in and observe classes taught by non-tenured faculty and provide a written evaluation of the professor's teaching. I take copious notes during the class, draft a report, and meet with the faculty member to review and revise that draft before sending it to our Chair.

In one such instance the junior faculty member and I had a wonderful follow-up discussion on teaching that focused on connecting with the students. She then sat in on my class, and her first questions in our follow-up discussion were: "How do you do that? How do you get the students to talk to you so freely?" The ensuing conversation was one of the main impetuses for this paper.

2. TEACHING and THE PROFESSORIATE

It is no secret that professors, at least at research universities, are hired for their research, not their teaching. That's understandable given the prestige and overhead dollars that professors' research brings to these universities. But professors are also required to teach, and the fact remains that many simply don't have any training at all on teaching, formal or informal.

Consider this: How many courses on teaching does a person need to get a job teaching third grade in your state? Here in Massachusetts, in addition to a major in one of the liberal arts or sciences, one

needs a minimum of 30 credit hours in an approved teacher education program. At UMass Boston, those hours include courses such as *Contemporary Issues in Education*, *Creating Effective Learning Environments*, and *Fostering the Development of Mathematical Thinking* [13]. One then needs to complete 12 credit hours of supervised teaching. At the University of Connecticut, that supervised teaching involves: "Class meetings providing orientation to student teaching followed by teaching in schools supervised by a member of the staff of the Curriculum and Instruction Department." [12]

Now consider this: How many courses on teaching does a person need to take to get a job teaching college? In most cases, the answer is zero. Of course, there are researchers who are excellent teachers and who expend a huge amount of time and effort on their teaching responsibilities. However, we don't hire researchers without Ph.D. degrees, because that's where they're supposed to get formal training and mentoring in how to do research. Without formal training and mentoring in teaching, people tend to teach simply the way they were taught, perpetuating some rather poor practices. The fact that most professors know little about research on educational practices is a recurring theme in Mark Guzdial's *Computing Education Blog* [3]. In a recent post, Guzdial even went so far as to ask: "How long before we get sued for teaching but not using the best teaching methods?" [4]

3. "THE SECRET OF EDUCATION"

Returning to my colleague who asked "How do you do that?," the best answer I could give was to quote Ralph Waldo Emerson: "The secret of education lies in respecting the pupil." [2] This brings me to my first teaching tip:

> *Teaching Tip #1*
> **Learn your students' names.**

When you're a male with a name like "Jesse" and your email address is "Jesse_Heines@uml.edu" and you sign your emails with "Thanks, Jesse," what does it tell you when you get a reply that starts with "Hi, Jessie"? To be kind, I've had people apologize for misspelling my name by saying things like "I have a daughter / niece / friend / colleague named Jessie and I'm just so used to typing it that way." OK, but I submit that the first step in showing respect to someone is knowing his or her name (or what they like to be called), complete with the proper spelling. Here's how I do it.

(1) I walk into the very first class with a print-out of the roster and my camera. I hand the roster to a student and ask him or her to help me. I then go around the room and take pictures of every student, giving each a number as I click away. I ask the student his or her name and my helper writes the number of the shot next to that student's name on the roster so that I can later match each picture to a name.

(2) I have students complete a simple online Google form that asks for their full name *and what they want me to call them*. While many students have nicknames that they use with friends and family, some don't want a professor to use such diminutives. Others clearly prefer, for example, to be called "Jim" rather than "James" or vice versa.

(3) I put the above two together using the "print contact sheet" option in Corel PaintShop Pro. I rename each picture file to the student's last name plus the name he or she wants to be called and print the pictures with their names in alphabetical order, 20 to a page.

This gives me a "visual roster" that I can conveniently have in front of me and refer to during class.[2] I use it every day to take attendance without having to call out every student's name. Even with a class of 50 students, that helps me learn *most* of their names within 2-3 weeks. Of course, the larger the class, the more difficult this is, but consider this:

Corollary to Teaching Tip #1
It's not important that you learn all of your students' names perfectly, but it's very important that you try.

The effect of calling students by name and referring to them by name when they raise their hands is astonishing, *even when you make mistakes*. Twins have tripped me up more than once, as have men who grow or shave off beards during the semester and women who drastically change their hair styles. When I get a name wrong we usually have a good laugh about it, but the students still appreciate that I am trying. I've had seniors tell me that in all the college classes they have taken, I'm the only professor who even tried to learn their names, and because of that, they feel much more connected to the class. The more connected they feel, the more likely they are to participate in class discussions and contribute to not only the technical, but the social fabric of the class, as well.

4. CONNECTING and CONNECTIONS

We all have different levels of comfort in discussing non-class-related things with students, and that's fine. But one should know that many students are hungry not only for the technical knowledge we can share, but also for the benefit of our experiences, both professional and personal.

4.1 "80% of Success Is Showing Up"

This quote (or variants) is commonly attributed to Woody Allen, but I'm using it here to refer to when you arrive in the classroom.

Teaching Tip #2
Come to class early to chat with students.

Showing up early sends a message that class is important to *you* and that you're eager to get started, thereby setting an important example. But in the context of connections, it also gives students an opportunity to connect with you before the formalities begin.

One of the most interesting questions a student ever asked me before class was "How old were you when you paid off your college loans?" When I told him that I didn't have any college loans, we got into a fascinating discussion of college life in the late 1960s versus today and the implications of those differences. The laser-focused relevance of that discussion to the student's individual concerns established a connection between us that spilled over to influence his renewed attention to the technical part of the class.

4.2 The First Person Singular

One of the first things I notice in quality restaurants is that when the waitperson comes over to read the day's specials, he or she says, "*I* have" as opposed to "*they* have" or even "*we* have." It is obvious that the waitperson isn't doing the cooking, but it is he or she who represents the restaurant, has the greatest influence on your enjoyment of the meal, will handle your complaint if something isn't right, and (perhaps most importantly) is the person who will be happy or sad with your tip!

Teaching Tip #3
Make the material your own.

The key here is that when you make the material your own, your excitement and enthusiasm for what you're teaching will come through, and those feelings will be contagious. If you *don't* have excitement and enthusiasm for what you're teaching, neither will your students. Those of us who sing in choruses will certainly agree that the spirit of the ensemble reflects the spirit of the director. If he or she is uninterested, the sound will be flat and dull and the audience will fall asleep, just like our students.

You don't have to be showman. You do, however, have to be a leader, and that begins with taking responsibility and making the material your own. One of the biggest compliments I ever received from a student was when he asked, right in front of the entire class, "Man, how did you develop such a love of programming?" That stopped me dead in my tracks. "I'm not sure," I answered. "To me it's simply just so cool to see how all these pieces go together to achieve the desired result." To that the student replied: "Yeah, it sure is," and another strong connection was made.

What did you like most about this course and/or the instructor's teaching?
Passionate about material, involves the students.

What did you like most about this course and/or the instructor's teaching?
He showed a lot of personal interest in helping students learn.

Note: For *negative* comments on my teaching as well as positive ones, go to teaching.cs.uml.edu and click "Student Comments on My Teaching."

4.3 Advising ≠ Rubber-Stamping

Advising is time-consuming. There's no doubt about that. But it still amazes me how little time we spend on such an important activity. Some advisors count on the students to figure out their own paths through the curriculum and meet with them only to rubber-stamp their course plans for the next semester.

The students who come to me for advising are all over the map in their preparation for the meeting. Some come with color-coded spreadsheets laying out exactly what they need to take every semester to complete their degrees. Others literally come with nothing. The latter walk in, hardly say "hello," sit down, and expect me to tell them what they need to take next.

Regardless, I start off each session with the same question: "How are you doing *this* semester?" Most students say that they're doing OK in Courses X and Y, but they're struggling in Course Z. I ask what they're having problems with in Course Z and why. We talk. We get to know each other a bit. Sometimes we even get into factors outside the classroom, such as having a roommate from hell. And very often, we talk about just how many hours the student is working in addition to going to school.

I try not to get too personal, but it's important to explore the factors that contribute to whatever issues the student may be having. Only then can one advise the student on which courses to tackle next and which to postpone to a later semester.

The key here is to give students the time needed to get a full picture of their academic lives. They pay a lot to attend our universities, and for many they'll be paying back student loans long after they graduate. I therefore argue that they deserve more than a few minutes of our time when trying to decide which courses they should spend their money on.

> **Teaching Tip #4** *(when helping or advising)*
> **Schedule each student meeting for
> at least 30 minutes.**

Not every advising session takes 30 minutes, but I allocate that time so that I can hopefully have a substantive discussion with each student. And here are the payoffs to me:

(1) I learn a lot about students that helps me understand the issues they have in my own classes.

(2) If the student decides to take a course that I teach, we already have a connection. At the very least, I know his or her name.

(3) These discussions are often the best parts of my day.

And when you meet with students, remember Emerson's "secret of education": respecting the pupil. Give the student your *full* attention. Consider this: How do you feel when you're meeting with someone and he or she takes a phone call and you have to sit there and try not to eavesdrop on the conversation until the call ends?

> **Teaching Tip #5** *(when helping or advising)*
> **Let the phone ring.**

I wish you could see the faces of students when they're meeting with me in my office and the phone rings and I don't answer it. Invariably they say, "Aren't you going to get the phone, professor?" "No," I answer. "I'm meeting with you right now. That's the most important thing at this moment. If the call is important, the caller will leave a message and I'll call them back."

Just as invariably, my students are shocked that I don't answer the phone. But it really gets their attention. It is not uncommon for the our meeting to move to a new level after such incidents, as the student now fully understands that he or she is truly the main focus of *my* attention. And once again this respect for *their* time spills over into the classroom and the effort they put in if they subsequently take one of my courses.

5. IT'S ALL ABOUT COMMUNITY
5.1 Student to Student
Students obviously spend much more time interacting with their peers than with faculty, and they are of course much more comfortable doing so. Thus, if we can get them to help each other learn the material, there is much to be gained.

> **Teaching Tip #6**
> **Get the students to help each other.**

Three tremendous quotes are relevant here. The first is from Albert Einstein:
> *I never teach my pupils; I only attempt to provide the conditions in which they can learn.* [This quote is always attributed to Einstein, but its original source is unknown.]

Those "conditions" are relevant classes, relevant classroom activities, relevant readings, relevant assignments for reinforcement, and relevant exams. That is, if a student — *any* student with the proper prerequisites — does the coursework conscientiously, he or she should be able to learn the material.

The second is from Henry David Thoreau: [10]
> *Those things for which the most money is demanded are never the things which the student most wants. Tuition, for instance, is an important item in the term bill, while for the far more valuable education which he gets by associating with the most cultivated of his contemporaries, no charge is made.*

The really interesting thing is that the student *giving* instruction usually learns just as much as the student *receiving* that instruction. This role reversal was captured perfectly by lyricist Oscar Hammerstein in a song from "The King and I" [5]:
> *It's a very ancient saying
> But a true and honest thought,
> That if you become a teacher,
> By your pupils you'll be taught.*

I like to tell students on the first day of class that I'm the *least* important person in the room. To their quizzical faces I then explain that I already know this stuff, so the real purpose of the course is for them to know it, too.

To get them to help each other, I use Piazza [8]. I'm sure that there are other wikis or listservs that would serve the purpose equally well, but I've been using Piazza for years and it simply works great. With 49 students enrolled in my GUI Programming I class in the Fall 2014 semester, there were:
- 103 total posts (questions and notes)
- 480 total contributions (posts, responses, follow-ups, etc.)
- 44 instructors' responses to questions
- 37 students' responses to questions

The most important statistic, however, was that the average response time to posts was 14 minutes! Clearly, that's because students responded to other students' questions before I did.

Poll Everywhere [9] is another great tool to foster class involvement. It lets students respond to questions via the web or by texting, and it tallies their responses in real time. It's free for up to 25 responses per poll, which even in a larger class is enough to get a sense of the students' understanding.

I even occasionally use Poll Everywhere as an ice-breaker when I come to class early as discussed in Section 4.1. I post a question like the one in Figure 1 as soon as I walk into class just to have them give me a feel for how things are going.

In addition to everything mentioned above, fostering community spills over into class discussions. When students feel comfortable asking questions and participating in class, there are livelier and more interesting discussions focused directly on their misunderstandings and sticking points.
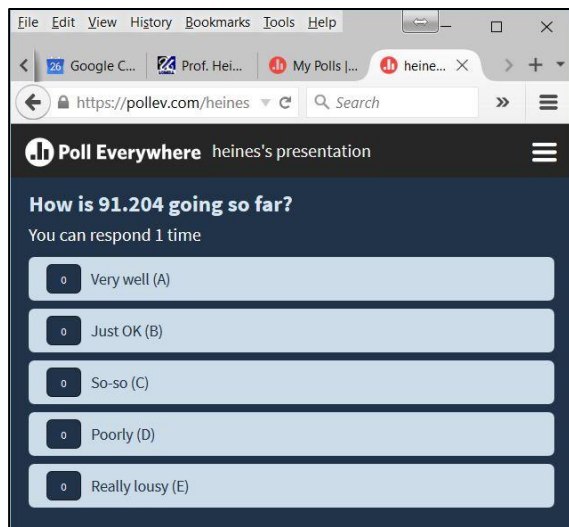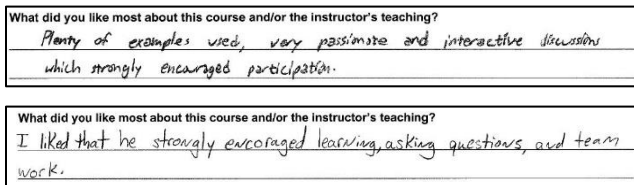
Figure 1. An ice-breaker question as displayed by Poll Everywhere.

5.2 Professor to Student

Connecting to individual students also contributes to building community. The first step in doing this is the hardest.

> ***Teaching Tip #7***
> **Respond to all student emails promptly.**

Yes, we all get too much email. Be that as it may, we simply have to respond to emails from students. My trick is to insist that students prefix the email subject header with their course number, which allows me to separate student emails from the flood of others using a simple filter. In exchange, I promise that I will open and respond to all emails that follow this rule before any others.

Despite this procedure, I still tell students *not* to email *technical* questions to me. Instead, I tell them to post such questions to Piazza [8], where they will often get an answer from a fellow student or teaching assistant more quickly than from me. I even tell students that if they email me non-personal questions and do not instruct me otherwise, I will copy their questions to Piazza and answer them there so that every student can see my response. The truth is that since I have my Piazza account set to email me immediately whenever a new post is made, there really is no advantage to students to email me directly (unless it's personal, of course). I see their questions just as quickly when they post them to Piazza.

6. "SHOW ME THE MONEY"

If you're old enough to have seen the 1996 film *Jerry Maguire*, you'll surely remember the line quoted above. It's the #2 most memorable line in the film, right after "You had me at 'hello'." [1]

6.1 Grades = Money

To students, the grades you "give" them are "money." I typed "give" in quotes because of course you don't think you *give*

students grades, you think you *assign* them grades based on their performance. However, students always refer to the grades they "got," not the grades they "earned."

> ***Teaching Tip #8***
> **Provide students with extensive feedback**
> **on their work.**

This is hard. You have a lot of students. Your course includes a lot of assignments. You and your teaching assistants only have so much time. As always, time is the enemy.

But students don't know all the demands on your time. They only know the time you spend with them and that includes the feedback they read on the assignments they get back. You and I can tell when students do an assignment at the last minute with very little effort. We're disappointed when they don't even seem to try. When students get assignments back with very few comments, they feel the same way. What's more, they may even feel cheated.

One approach that I use is to keep a plain text file open when I'm grading a student's work and type all my comments there and then email that file to the student. (I wrote a small script to bulk email all the files. Virtually all Learning Management Systems provide the same service.) I work carefully with my teaching assistants to train them to do likewise. This level of documentation also provides concrete points for discussions with any students who come to see me to complain about their grades, regardless of whether I or one of my teaching assistants did the actual grading.

I also use Dragon NaturallySpeaking [7]. For certain assignments, dictating comments is faster and easier than typing them, so this allows me to give even more feedback. The only caveat is that you have to proofread what you dictate very, very carefully. That, of course, takes time, too, but even after "training" the software and using it for a while, some very strange errors can appear in your dictated transcript. But all-in-all, Dragon helps me give students move extensive feedback, and that's the goal.

6.2 Redos and Mulligans

One thing that always amazes me about assignments, especially in technical fields, is that students typically only get one shot at them. That's very unrealistic. Every computer program can always be improved. What's more, once one gets the basic program working, there's still a lot that can be learned by improving its efficiency, data structures, and documentation.

> ***Teaching Tip #9***
> **Allow students to resubmit a limited**
> **number of assignments.**

Rewriting is common. James Michener said: "I have never thought of myself as a good writer ... But I'm one of the world's great rewriters" [15]. Here's another great quote: "There's no such thing as good writing, only good *rewriting*" [reliable websites attribute this quote to Louis Brandeis, Robert Graves, and Harry Shaw, so it's uncertain who the original author really is].

One has to put limits on how many times and by when a student can resubmit as assignment to avoid "churning," but it is clear that there is much for students to learn by redoing assignments on which they get poor grades. Allowing limited resubmissions can do much for a student's confidence, too.

6.3 When To Do SETs

Another practice that I find very strange is the administering of student evaluations of teaching (SETs) at the end of a course. What good is it to know *after the course is over* that students found some of the personal stories that you use to illustrate certain concept applications more distracting than helpful? This is feedback that I once got on my SETs, and the first time I got it, it was a real revelation to me.

Teaching Tip #10
Do SETs in the middle of the semester,
not at the end.

Your university may require you to do SETs at the end of the semester using a standard, machine-readable form (as our does), but that doesn't mean you can't make up your own SET and administer it whenever you like. Doing your SETs in the middle of the semester allows you to gather formative information that is actually actionable. That is, with half the course remaining, you can actually *do* something about any problems that are identified *in the current course*. At the end of the semester, the information you learn from SETs can only be used (hopefully) to improve your teaching the *next time* you teach the course, which may be never. And even if you do improve the course the next time you teach it, that's of no value whatsoever to the students in your current course.

I do my mid-semester SETs using a Google form with questions such as those shown in Figure 2. This is quick and easy for students to complete, and Google automatically tallies the responses as shown in Figure 3. The form also has open-ended text boxes where students are asked to complete the following sentences.

- This course would be better if ...
- I would learn more from this course if ...
- Prof. Heines would be a more effective teacher if ...

Here's an example of a major course change I made mid-semester based on student feedback. I teach Computing IV, our second semester sophomore course and the students' second in C++. We often have transfer students who attempt this course but simply don't have the requisite C++ background. I was therefore spending significant time reviewing basic C++ concepts. A number of students commented in mid-semester that I was spending too much time trying to accommodate students who shouldn't really be in the course. I therefore stopped doing so much review in class and had the students who were deficient work with a teaching assistant or with me individually. Not only did we cover more material in the remainder of the class, but the students were much more engaged.

The benefits of doing SETs in the middle of the semester are not limited to making the course better for your current students. If you improve the course for them, they will almost certainly give you better ratings on the required SETs at the end of the semester. And if you're a lecturer, adjunct, or non-tenured professor, those ratings may be a major factor in whether your contract gets renewed for the next year. So even if there are some things you can't change, just giving the students an opportunity to give you feedback while the course is running can reap huge benefits on both sides.

7. GET BETTER BY OBSERVING OTHERS

Artists look at others' art, and musicians listen to others' music. They do so not to imitate, but to expand their horizons and get new ideas. I therefore posit that to become a better teacher, you should follow the next teaching tip.

Figure 2. Multiple choice questions on my mid-semester SET.

Teaching Tip #11
Sit in on your colleagues' classes.

Prof. Bill Moloney, our operating systems specialist, is the smoothest lecturer in our department. His classes always have a perfect arc: intro – content – summary. Students so love the way he presents threads and multitasking and inter-processes communication that one created a Twitter account and live-tweeted some of the funny things he said during class. But regardless of whether he's delivering serious technical material, joking around to keep the students' attention, or answering a question, Bill never misses a step.

I know very little about operating system internals, but I have learned a lot about lecturing from sitting in on Bill's classes and watching this master at work. As I wrote in Section 1, I've sat in on others' classes, too, and invited them to sit in on mine. As an added benefit, this builds a strong rapport between junior and senior faculty that makes it easier to talk about teaching issues if they arise in promotion and tenure proceedings.
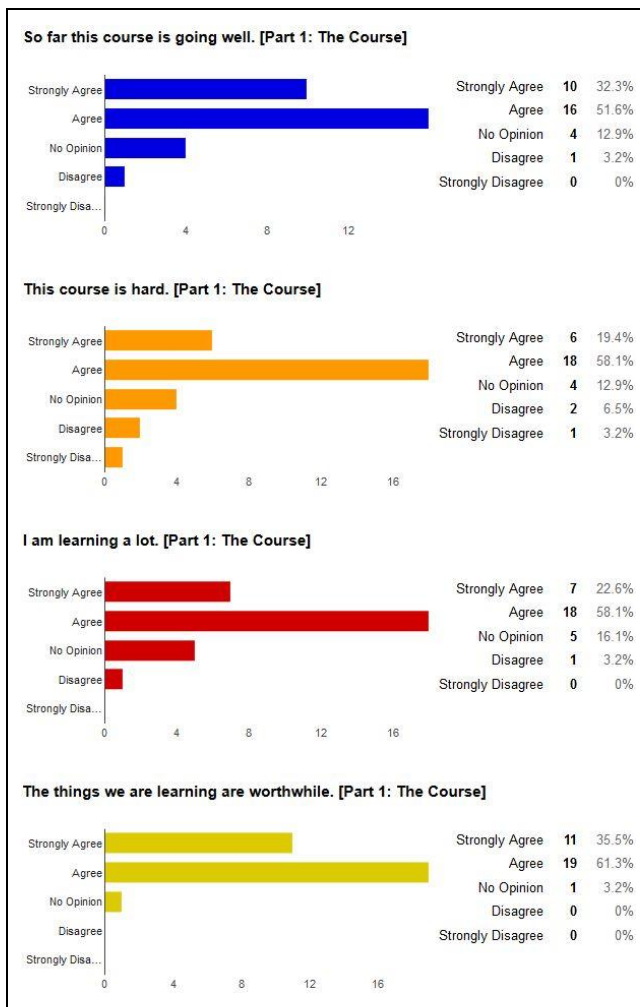
So far this course is going well. [Part 1: The Course]

Strongly Agree	10	32.3%
Agree	16	51.6%
No Opinion	4	12.9%
Disagree	1	3.2%
Strongly Disagree	0	0%

This course is hard. [Part 1: The Course]

Strongly Agree	6	19.4%
Agree	18	58.1%
No Opinion	4	12.9%
Disagree	2	6.5%
Strongly Disagree	1	3.2%

I am learning a lot. [Part 1: The Course]

Strongly Agree	7	22.6%
Agree	18	58.1%
No Opinion	5	16.1%
Disagree	1	3.2%
Strongly Disagree	0	0%

The things we are learning are worthwhile. [Part 1: The Course]

Strongly Agree	11	35.5%
Agree	19	61.3%
No Opinion	1	3.2%
Disagree	0	0%
Strongly Disagree	0	0%

Figure 3. Summary of responses to representative mid-semester questions as displayed by Google forms.

8. THE JOB OF TEACHING

Most of the teaching tips in this paper don't really address what you actually do in your classroom or how you structure your course. Instead, they address the attitudes and practices and student-teacher relationships that color everything you do in your job.

> **Teaching Tip #12**
> **Be yourself.**

There are great teachers who are strict and equally great ones who are more flexible. Some are very serious, others joke around a lot. Some are casual, and some very formal. But they all have one thing in common: they care about their students and connect with them in a variety of ways.

Over 100 years ago, in 1912, Edward L. Thorndike wrote in his book *Education* that "the best teacher uses books and appliances as well as his [or her] own insight, sympathy, and magnetism" [11]. Students see through falseness in a "New York minute." You're never going to be your students' best friend, but you've got to gain their trust so that they follow the learning path you lay out for them.

Teaching computer science is hard. Perhaps more than any other field, we're actually trying to prepare students for a world that hasn't been invented yet. Only the youngest of us learned the stuff we teach when we were students. The rest of us have had to learn it on our own, building on the foundational knowledge we acquired during our undergraduate and graduate student years. It's a tall task.

But it's a noble task, as well. To me, the task is best summed up by the quote most often attributed to Christa McAuliffe: "I touch the future. I teach." [6] [There is some dispute as to whether this quote is original to McAuliffe [14], but that's of no consequence here.]

I think of the job of teaching in simple terms: helping students along their way. Regardless of why they chose to be CS majors and to enroll in my classes, my job is to help them learn as much and as well as they can and to inspire them to want to learn *more than I can teach them.*

All of us in higher education were ourselves helped along our way by inspiring teachers. Otherwise, none of us would have spent all those years pursuing doctoral degrees. As I reflect back on my 30+ years of college teaching, I would like to give thanks to those who helped me, but unfortunately all but a few of them have passed on. I therefore thank them and honor their memories by following in their footsteps, "giving forward" to those students who may someday follow in mine.

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10. ENDNOTES

[1] I gratefully acknowledge the significant improvements to this paper suggested by editor Bonnie Heines and colleague Prof. Fred Martin after their reviews of earlier drafts. I also gratefully acknowledge the hundreds of students *who have taught me* how to be a better teacher.

[2] All students pictured here have granted written permission for photographic images of themselves to be included in publications and presentations on my courses.