A brief glance at a novice teacher’s struggles with teaching computer science.

Vishakha Parvate
ED321A - Spring 2005
Dear Sophia,

It has been a very long time since I have written a letter to you. This year has been insanely busy and now it is finally starting to wind down. It is my last quarter here at Memorial University, studying Educational Planning and Tools. My focus all along has been the K-12 classroom and the role of the teacher. I have always believed that sustainable reform in the classroom needs a dedicated base of teachers to buy into it. It needs regular teachers in regular classrooms willing to turn their worlds into havens of educationally valid experiences. Otherwise, what you end up with is a visionary program that dies with the visionary.

As I look forward to working in the field of K-12 classroom reform, I also feel compelled to look back and see where I came from. Why am I in this program? I was supposed to get a programming job after my graduate degree in Computer Science. Why did I teach instead? Thinking of my years teaching as not just a bullet point on my resume but as a formative experience that led me down this path, I am forced to explore who I am today and what vestiges of the teacher are there not just in my life but in the life of the others that I touched - my students.

So as luck would have it, I was asked to write a paper for a class on conceptions of qualitative and ethnographic research and I chose to examine myself as a novice teacher struggling to teach formal methods in a visionary program. It was a difficult task because it involved looking into myself and my motivations and be completely honest with myself. On the other hand, it was a unique opportunity not only for deep reflection but also to get reactions to the reflections. I will keep you posted on what happens next.

Loads of love,

Jackie.

May 20th, 2005
Who was she?

You are how old?
23!!!
Wow! You are young.
Nonsense, she is old enough. I had my twins when I was her age.

Young?

Not very confident of content
Why is she teaching computer architecture? She has no experience with it.
But she has a good idea of how to frame it and Mr. Roy has helped her to find a textbook that she can follow. Hmm, textbook? We usually just teach from reference books. I heard her job talk and she is shaky around the internals of architecture and file systems. Yes, but remember she is very confident and nobody else wants to teach it. Let's just try her out and review her teaching assignments next semester.

Inexperienced?

So this is your first job teaching?
Yes.
Are you sure you can handle the class?
These students are very brilliant. You should practice talking in front of a class and writing on the blackboard. At least, you have good handwriting. Go on, then don't worry too much.

Inexperienced?

Jackie was delighted with the opportunity to teach at DCSUP - a visionary school of computer science set in Western India. She had arrived in its sylvan setting two years earlier as a student.

She was a math major, a university topper and while she was passionate about mathematics and the teaching of it she was disillusioned with college mathematics. Also she was fearful of failure her first semester as a student because she had no computer science background. She however, was completely won over by the Dijkstraian approach to introductory programming. She could use her math background well here and that boosted her confidence. The teaching of computer science in DCSUP resonated with what she dreamed of seeing in school math classrooms.

Her mathematics classroom in school had been the farthest from how she wanted to teach children. She had been good at mathematics ever since she could remember and remembered being very troubled that her friends could not relate to her joy in it. Furthermore, she hated the fact that expertise or lack thereof in mathematics was a divisive agency in school used not so much to direct instruction as to segregate students into the doers and non-doers.

She was a young graduate of a program that encouraged her to think independently. She was the new teacher the department took on, based on her ability to hold the attention of a class of 50 and convey effectively what she was trying to say. She was an experiment waiting to happen.

Who was she?
The positive side-effect was that it made her highly approachable and she was very friendly with all the students. I could go to her at any time with any stupid doubt. She listened to a lot of crazy ideas and encouraged me to continue working on the algorithm derivation. She worked with me to derive the proof in class interactively. She was so young, just like one of us. I would spend long “chai” sessions discussing graduate school applications and eventually got a recommendation from her.

(chai = Indian tea)

Jackie was barely a year older than most of her students. She valued the intimacy it afforded her but was well aware of the dangers of being too close to her students. It was hard to be older than what she was. Her aim was to strike a balance between being approachable and being taken advantage of.

She began by deciding that she was going to learn the names of all her students (no mean task when you consider that there were 55 of them). She was also determined to file away a small profile of each of them in her head so that in subsequent years she would be able to recall what her students had been like. In the same spirit, she was also determined to earn the respect of her students by preparing well her content matter.

She was largely committed to the interactive style of teaching and struggled to have meaningful classroom interaction with her students. Because she sensed that she was not reaching parts of the class, she set up meeting times with her students. She made sure that she had an open office and that the students felt welcome. She spent many hours sitting in the cafeteria in the evenings sipping endless cups of “chai” and talking with her students about their lives. At the end of the semester, she collected qualitative feedback from her students about her teaching and interaction styles.

She was largely successful in reaching out to the students in a positive way. However, she regrets that she is not in touch with more of her students. She feels proud of those of her students who did well but is aware that for every life she touched there were many whom she couldn’t reach. She is also aware that she was woefully inadequate in terms of following up on her students once they graduated. But she regrets most those that she lost because they were bored with her classes.
Hey!!! you bunked class today. She had us do the proof on the blackboard - one line at a time.

I had a great time because I had never proved commutativity of addition quite that intuitively. The backward approach is great.

Oh god! If I have another “interactive” class I am going to be wild. Why can’t she just lecture and hand out notes? Yaar, I have nothing to look at before exams.

Plus, you can’t fall asleep or do homework from GT. I was trying to study for the test - kept calling on people to complete the proof.

She makes it very clear to follow you junta! But even though I love the fact that I can talk to her during class, sometimes I think it’s because she actually doesn’t know and comes to class hoping to find out.

(junta = folks, yaar = yo man)

Jackie had studied all her life in schools where the only class participation that was expected was a “correct” answer to the teacher’s questions. It was only while a student at DCSUP that she first experienced what it was like for knowledge to be constructed and instead of disseminated and absorbed.

She was determined for her students to have an experience that allowed them equal partnership in the learning episode. So even though she was a “lecturer,” she made real effort to build in entry points for discussions. She designed most classes to have one section which built on inputs from the students. The students had a safe space to raise doubts and get them answered. She was open to students suggesting topics for discussion during the lecture.

This open-ended format meant that she had to be very well prepared with the content matter. Due to the unscripted nature of the lecture, there were occasions when the students asked questions to which she didn’t know the answers. She admits to then using the open-ended format to generate answers from the students. There were days when she was less than well prepared for her class and she would depend on the practice of “constructing knowledge” to tide her through the day.

Another aspect of her the interactivity of her classes had to do with the individual work she did with students who were so inclined. There were at least two students whom she remembers working with on specific algorithmic derivations. She encouraged them to think out of the box and write papers to present their working.

Interactions with her are a key memory for her students.
Whew! that was some paper. I couldn’t answer the open-ended section at all.

Hey, do you know what the entire princess in the tower story was all about? I didn’t know where to begin.

Haha, I figured it out. It was mathematical induction!!

Ok so I am B.Sc. with Mathematics and I think I am going to fail this test. Not at all like what I am used to.

I was going to ask for an exemption in this course because I have a M.Sc. in Math. She asked me to try the class till the first midterm. Am I glad I didn’t opt out. I would have never been able to clear the exam without attending class.

I wonder how she is going to grade this exam though.

The computer science program at DCSUP was unique in the university in that it subscribed to notion of continuous assessment.

A typical course had at least two midterms, one endterm final, 3-4 class tests, 2-3 assignments and maybe a course project.

As a new teacher, Jackie was mentored by a senior faculty member. He was especially keen on the supervising the quality of her assessments. She liked the idea of open-ended exam questions, but was unsure how to grade them. She decided to design assessments that the students would find interesting. She believed in learning as an ongoing experience and wanted the exams to provide not just a space for evaluation but also for learning.

Most of the exams were of a dual nature with multiple choice questions to test skills, followed by open ended questions designed to test the students ability to recognise problem situations where the course material could be used. It was an attempt to integrate problem based learning in the exam hall.

The “challenging” exams, the interactive lectures and the approachability were the three things that stick with her students even after all these years.
PT remembers.....

"As an instance of how an interactive class can make learning fun, interesting and challenging at the same time, I recall a particular day in the MF class. The instructor always had come with an intention of covering a certain topic in logic. There was a result to be proved, and instead of just writing down the steps of proof line by line from notes, she turned it into an interactive exercise. I keenly followed the proof, asking questions and making suggestions, interrupting her several times. But instead of asking me to hold the questions for later or taking offence at better suggestions/corrections, she involved me in working out the proof and the whole class turned into a one-to-one discussion between me and her and we nailed the proof before the end of class. I don’t know about the other students but I had a very satisfactory and fun class that day."

UD remembers...

I remember her examinations being quite original. There was a problem on one final that had a riddle like quality. It was simultaneously captivating and it also tested our ability to construct proofs using Mathematical induction. I remember this problem vividly because only myself and one other student were able to solve it. I do not remember being as interested in my Math classes prior to that class.

Those two classes have stood me in good stead and I can, now 6-7 years later, recall various Numerical techniques and basic Algebra that I need off and on. The credit goes to Jackie for her diligence and hard work in instructing the class.

AM remembers.....

Jackie didn't command the same respect/awe as some of our other professors. The positive side-effect was that it made her highly approachable and she was very friendly with all the students. T

The subject Jackie was teaching was a jumbled collection of topics ranging from predicate calculus to abstract algebra. It would have been a challenge for any person to teach it in a coherent fashion. But she was not able to inspire interest in the subject to the extent an experienced teacher would have. When I say that, I am subconsciously juxtaposing her with a couple of other teachers we had in that semester. While not very fair, that comparison still persists even after all these years.
Dear Sophia,

How have you been? Are you eagerly waiting to see where my chronicles lead me? Well, I am looking right now at the content of what I taught.

I went through my old login and found the files for all the courses that I taught at DCSUP. I cannot believe my “portfolio” - so much breadth in the sense that I have records for grades of all the courses I taught, however very little depth in that there are no lecture notes (I guess I had paper notebooks then!), no handouts, no personal reading notes or course inspirations. I am ashamed to say that I no longer have the qualitative assessment sheets that I collected from my students either.

At first, I was inclined to believe that the lack of depth was a direct representation of my attitude towards my students and work. However, honest self-examination relieves me of this guilt and I realise that the nature of my portfolio was a function of what tools I used to read and think and write.

To cut a long story short, my content seems to be largely confined to the theoretical and mathematical bases of computer science. I remember that I loved to teach Discrete Math and hated Computer Architecture. But surprisingly, the subject in which I got my only C as a student - Automata Theory was the last one that I taught and I remember a very satisfying course. I was fascinated by the role of formal methods in computer science and found it almost magical to unfold the mysteries of programming in this fashion. To quote my inspiration - Dijkstra - “Teaching to unsuspecting youngsters the effective use of formal methods is one of the joys of life because it is so extremely rewarding”

Will keep you updated on the progress and love to you - Jackie.

May 25th, 2005
Dear Sophia,

Last week when I wrote to you I was in the beginning stages of writing my paper for the class on conceptions of qualitative research. I have struggled to unearth my innermost motivations and feelings about who I was and how that has made me who I am today.

Well, the more I look, the more I realise that much as I wanted to be a teacher that my students would remember as the “Oh she was good. She made a real difference!” in reality it is I who remember them as “Oh they were great students, they reached out to me when I was a novice and made me part of their lives!”

In trying to learn about my enduring outcomes in my students’ lives, I have learned instead of their enduring outcomes on my life. They touched my life and made me realise even more strongly how satisfying it is to be a teacher. They have taken the ennui and the desperation away. They make me glad that I am in the business of education. At the end of writing this paper, I ahave now new “courage to teach”.

I dare to dream that some day all schooling will be a face-to-face experience.
I dare to teach young children inspite of the odds
I dare to believe that some day educational research will actually translate into meaningful classroom experiences.
I dare to think that classroom experiences are a valuable resource for the content of educational discourse.
I dare to come closer and fly....

“Come to the edge”, he said
They said, “We are afraid.”
“Come to the edge”, he said
They came
He pushed them
And they flew.

Love to you......
Inspirations

• Barone Tom, Touching Eternity: The Enduring Outcomes of Teaching, Teachers College Press (2001)

• Blake Robert, Becoming a Teacher: Narratives of Elementary Trained Teachers, Maryland Collaborative for Teacher Preparation, Towson University, Towson, MD, (April 2002)

• Dijkstra E. W., On the cruelty of really teaching Computer Science, EWD1036, University of Texas at Austin, Austin, TX, (December 1988)

• Intrator Sam, Spots of time that glow: Portraits of educationally valid experiences, Ph.D. thesis(unpublished), Stanford University (1999)

Acknowledgements

• To all the people that helped shape this teacher
• To all my students
• To all my teachers

Thank you....