Teaching Statement

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Philosophy and Goals

My philosophy of teaching and the goals that I pursue in teaching are tightly related. Teaching is the process of spreading acquired knowledge to society both for helping individuals to employ this knowledge in their work, and also for preparing the future’s researchers who know how to think and explore new subjects on their own. This might seem like the full scope of teaching, but for me, this is only half of the story. Indeed, I believe teaching is also a crucial experience for the teacher, especially one who pursues research goals. This is because the teaching process starts by organizing the knowledge and continues by communicating this organized content. As part of this organization, the content shall be constantly updated to reflect the best selected material in this moment, as research findings constantly evolve and thus affect the landscape of what is valuable to know and learn. Moreover, the process of organizing and communicating such updated content to new minds always has the potential of shedding light on subtle aspects of the material that could themselves shape research questions. That is why, in my opinion, research and teaching are not two separated and isolated tasks, but they rather build upon and benefit from each other.

Going back to the more ‘traditional’ view on teaching, namely its focus on the benefits for the learner, my philosophy is that the teacher’s goal should be to communicate the skills, and ideally develop the passion, that it takes to deeply explore undiscovered scientific territories. That is why, I believe teaching should focus on communicating the thinking process rather than copying the material to students’ minds.

Strategy and Methods

I believe every teacher should search to find and polish their own style of teaching, as every person has different qualities. Knowing one’s strengths and weaknesses helps improving the latter and leveraging on the former, but it also allows one to shape their own methods and approach to teaching. I have tried to be an “experimentalist” myself by trying various methods and approaches while relying on the common guidelines and previous experiences of others. In the following, I describe various strategies and methods that I have employed in my own teaching in UVa. The discussion covers specific issues regarding methods and tools, and in each case I describe my efforts and findings.

Using slides or writing on the board? Before teaching my first class at UVa, I spent some time researching on how I could use the technology in my class. The content of my first course (like most of my classes) was partly based on mathematical proofs. As a result, I decided not to make a heavy use of prepared slides and was inclined to use the traditional board. The reason was that when it comes to proofs, using the board usually has a better pace to follow than what a typical pace of using slides offer. Yet, I did not want to lose the benefits of using slides either: they can help communicating the material in a more compact way. At the end, I decided to write my teaching notes on a laptop with a digital pen and use half empty PowerPoint
slides with enough space left for my proof notes. This method allowed me to organize the content of each material as compactly as I wanted, while the process of writing the proofs using the stylus controlled the pace. I found this method effective and used it in my subsequent teachings.

**Recording the class.** After using a “digital board”, I realized I could use the technology even more effectively: I could record my lectures in full. The idea was not to produce a video showing me physically, but rather I could produce a video that simply shows the digital board synced with my voice. I was worried that the students would now have less motivation to show up in class and might simply rely too heavily on the videos. After seeking advice from the UVa’s Center for Teaching Excellence (CTE) as well as some faculty at the CS department, I learned that providing the content of the class online (ideally right after the class) could indeed help to increase class participation. That is because one main factor in lack of class attendance by students is that they feel that they have fallen behind and that they need extra time to catch up. However, if they could access class material, almost in full, right after missing a class, they will have more chance to catch up and attend the next class! My own experience after trying this method matched this analysis and students also showed a lot of interest about recorded material in their course feedback.

**Lecture notes.** For courses that involved more advanced material, I also provide my own lecture notes produced based on the exact content of the class. The method that I used for producing these lecture notes was to get the help of the students themselves. Namely, as part of course requirements, I asked students to scribe the first version of the lecture notes (in groups), and then I gave them feedback for further improvement. Most recently, in my Cryptography class this semester, I used the website Sharelatex and prepared templates that I shared with students and guided them through the process.¹

**Interaction inside and outside class.** In the fall of 2017, I co-taught the class Discrete Math (CS2102) together with Prof. David Evans. This was my largest class so far with more than 300 students. Co-teaching a large class like this was a hugely fruitful experience for me on its own, but here I’d like to focus on an experimental aspect of this class that David and I tried by leveraging on the presence of two teachers in class. The challenge was that for such a huge class, not every student might feel confident to ask their questions, so we thought of allowing online questions inside class. Namely, we used the application Slack for live questions, and one of us who was not teaching that day (but was in class) would answer the questions. The only down side, in my opinion, was that: now there was a source of “distraction”, as students might want to keep an eye on the Slack app constantly. However, I believe the upside aspects made it worth it overall, and we got a lot of questions every time. I look forward to using it again.

**Evaluating of Success**

Even though the course evaluations are hardly the best measure for successful teaching, my personal experience is that whenever I felt that I have had done a better job in my teaching, I also received more positive feedback from the students. I refer to the enclosed course ratings provided in my portfolio. To summarize, with the exception of my Discrete Math class, I always received instructor ratings ≥ 4.3 and course ratings ≥ 4.2. Our Discrete Math class got rated 4.03 and I got 4.19 as instructor, which according to the information I received in my 2017 annual performance review, “was higher than the instructor score for 6

¹The scribed lectures of my most recent cryptography class are available at: [https://www.cs.virginia.edu/~mohammad/courses/crypto/sp18/lectures.html](https://www.cs.virginia.edu/~mohammad/courses/crypto/sp18/lectures.html).
of the 7 sections of CS2102 offered between Fall 2015 and Spring 2017.” I skip quoting selected opinions from the feedback I received, but I highlight a general theme in my feedback. Students usually found my classes challenging at first but fruitful at last. That was particularly emphasized in students’ feedback for our co-taught Discrete Math class.

Below, I quote two particular feedback that I received outside the course evaluation system. The first one was from a student abroad about my Computational Complexity class’s publically available videos.

I am a PhD student at IIT Ropar, India. I wanted to thank you for your lecture videos of Computational Complexity on Piazza. The videos were really amazing. I used to find the subject very tough but you have explained everything in a very simple and elaborate way. That helped me grasp the subject well. I had my comprehensive exam and your videos helped me extensively in preparing for it. These were the first videos of this subject online. I really appreciate the way in which you explained every topic.

The email below was sent by a UVA students about his project in Topics in Cryptography seminar.

This project got me the job I’m going to take. It’s at IBM’s linux technology center in their security group. Factorable.net and insufficient entropy [this was the project’s name and subject] just happened to be my interviewer’s favorite subject about the linux kernel. Thanks again, and I encourage you to offer this course in the future to undergraduates. It worked out well for me.

Efforts Made for Improvement

I have always tried to benefit from the great resources that are available to me to improve the quality of my teaching. Two great sources of good feedback include: course evaluation comments and advice from my more experienced colleagues. The latter includes experts’ advice from UVa’s CET center. In what follows I will describe two specific examples of my efforts to benefit from such resources.

The Course Design Institute. In June of 2014, I participated in the Course Design Institute (CDI) event at U Va, which was a crash course offered by the Center for Teaching Excellence (CET) on how to design new courses. There, I learned through examples and practice that the best way to design a course is to start from the goals and then derive from them the tools, methods, and details of the syllabus. I employed this approach in all my own courses. The CDI event further polished my own idea of engaging students in groups to work on the problem sets and focus the learning process around the students themselves.

In-class teaching analysis poll. In the fall of 2015, I asked for an Observation and Teaching Analysis Poll, which is also a program run by UVa’s CET. The amount of detailed feedback that Dr. Trevett-Smith from CET gave me after interacting with students in an (intentionally unannounced) in-class session was very impressive. The results gave me a detailed picture of what elements of the class were helping with students’ learning experience and what elements rather interfered with it. In particular, students unanimously found the recorded videos of the class useful, but also asked me to get a better microphone!
Future Plans

After five years of experience and trying various methods and strategies, going forward, I am planning to further focus to refine my methods and strategies going forward rather than changing them completely. Namely, knowing the big picture of how I would like to approach teaching, I want to fine-tune details that still could make a difference. Having said that, I will also look for new tools and opportunities that might become available in the future. I also constantly look forward to very useful advice that I could get from my students and colleagues for further improvement.

I plan to further incorporate the results of my research findings as well as other relevant research material that are not yet part of standard textbooks in my courses to further enrich and update their content. Also, as explained above, I develop lecture notes for my classes as a useful product of the classes that I teach. One future plan I have is to refine those lecture notes and turn them into book chapters that would, ideally, shape some of future’s textbooks.

Finally, a few words about the subjects of the courses that I plan to teach. My plan is to continue teaching graduate and undergraduate courses in the fields of Computational Complexity, Cryptography, Algorithms, Discrete Math, and Theory of Computation. So far, I have taught all of these courses at least once, but for Discrete Math and Theory of Computation, this has happened only once. Thus, I look forward to improving the quality of such classes in my second efforts. I have already started to think about how to refine the content of these courses and look forward to teaching Algorithms in Fall 2018.