Teaching Statement  
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As a scholar working to advance universal education, I naturally value effective teaching. I view teaching as a relationship in which I convey that 1) learning is meaningful beyond grades, 2) a course is worth the required work, and 3) my approach to communicating the topic is useful. I’ve recently worked on restructuring the standard college course / assessment model to optimize this philosophy and have recently converged on what I believe are my fundamental principles for designing my courses. As expected, experiments in my courses have come with both successes and failures.

### Overall Teaching Philosophy

My overarching philosophy focuses on communication and persuasion by developing three layers of trust. I first try to divert attention from grades. A student once came concerned about a missed lab, expressing concern about his grade. I told him to do the lab anyway, communicating that the grade is not as important as the learning. This student later thanked me, admitting that his understanding of the lab was paramount in acquiring his internship. These decisions communicate a clear philosophy: that knowledge is more important than the grade received. This is the first layer of trust that I build.

This matters little, though, if students are not convinced the course is worthwhile. I expend effort inviting students to reflect on the broader context of the material. For example, my HCI class features several guest lecturers who discuss the applications of HCI in their professions. I regularly argue that the material is useful and practical. This inspires students to take HCI seriously, and develops the second layer of trust.

I then persuade students that my methods are useful in accomplishing the goal of learning. My HCI course thrives on vibrant discussion, and I’ve observed that minor differences in the learning environment can affect the course significantly. I started asking students to refrain from using laptops in lecture, arguing that HCI requires attention, strong opinion, and critical analysis. This has led to an energetic classroom with high attendance rates. Other small changes include using a smaller classroom and asking students to sit closer to the front of the class. While these rules could be perceived as draconian to an outsider, communicating the reasoning for such rules is imperative, as it creates the desired layer of trust.

### Teaching Innovations and Course Creation

It is important that course mechanics be reflective of this overarching teaching philosophy. My goal when innovating is to help every student succeed, especially the most vulnerable. I’ve initiated efforts to address concerns observed in course structure / assessment and have developed six design principles in response. I hope that these course designs will help students focus on mastery and limit stress. The first principle is to communicate ***well-specified goals***. When I design a course, every component must relate to learning objectives. For this reason, I’ve moved to a module-based approach in which students see a breakdown of course modules and understand how each assignment fits into the grand structure of the course. Additionally, the letter grades in my courses now map directly onto mastery of individual modules (e.g., ‘mastering’ each module earns an ‘A’). The second principle is the ***freedom to fail***. I have observed many students struggle on topics, only to submit insufficient work. I’ve committed to implementing mechanics that allow students to fail, reflect on their work, and succeed in the end. Most of my recent courses have moved towards having flexible deadlines and multiple submissions.

The next principle is ***meaningful choice***. I believe that students should be given unique, equally feasible paths through course material. To support this, I’ve implemented multiple optional advanced assignments (i.e., some students might want to continue exploring graph theory while others assembly programming), multiple combinations of paths to certain grades, flexible test and quiz opportunities, and other similar mechanics. The next principle is ***assessment-driven feedback***. In my courses, I’ve moved towards having a large number of small-grained assignments that, when possible, can be graded automatically or very quickly. In this way, students can continuously submit work and receive feedback. I’m also experimenting with short weekly ‘exams’ instead of one or two larger midterm exams so that students receive regular opportunities for feedback.

The last two principles are ***concrete / permanent milestones*** and ***visibility***. The former addresses the fear that the next assignment or exam will lower one’s standing. I believe that students benefit when able to focus solely on moving towards their goals, without fear of achievement being revoked. My current courses describe a set of high but irrevocable standards to reach each letter grade, so students can be confident in progressing. Relatedly, visibility involves the ability to always see and understand these milestones, via the course website or similar.

I first implemented these ideas in my Data Structures and Algorithms 1 course (Fall 2019). Students were given a large amount of flexibility and responsibility. The course was given my second highest course rating (4.52/5) and my instructor rating was among the highest I’ve ever earned (4.62/5). I will continue experimenting with this course structure.

### Failures and Lessons Learned

The application of my teaching philosophy has been generally successful, but I’ve endured my share of learning moments as well. I’ve experimented with many significant shifts from the standard lecture / exams / final structure. For example, I’ve experimented with essay-style exams (HCI, Fall 2013), bi-weekly take-home quizzes instead of exams (AI, Spring 2015), required attendance (multiple courses), an ‘experience points’ game-like grading system (Game Design, Spring 2016), and very large hierarchical team structures (Game Design, Spring 2020). I think it is important to tweak course designs to find new effective structures, and be ready to admit when something does not work. All of these experiences taught me an important lesson: that our students are not guinea-pigs, and can easily discern between meaningful shifts in course design versus cosmetic ones. For example, the ‘experience point’ system mentioned earlier was one in which assignments were worth ‘experience points’ which monotonically grew. Students, however, understood that this was merely a cosmetic change, and that the percentage of the maximum possible points was their real ‘standard’ equivalent grade. Strategies like this did not improve the course for students, but merely obfuscated the understanding of their own progress. I’ve also learned that students are fairly forgiving of these experimental moments as long as the instructor communicates the reasoning clearly which has emboldened me to continue to try and find novel ways to improve the classroom.

### Miscellaneous Teaching Successes

There also exists several experimental moments in the classroom that I am proud of. In my Artificial Intelligence course, I produced two assignments that were successful. For the first, I built a complete simulator (complete with a GUI) of the popular board game *Ticket to Ride*. Students were invited to create their own algorithms to play the popular board game (the simulator allowed humans to play against the bots as well). The class had a competition to see which algorithm played the game that best and this led to excellent class discussions in which we watched the bots play while students explained their strategies. A similar assignment involved building bots to take part in a hostile negotiation (the bots were determining how to split a set of valued goods between them). This assignment led to similar strategies, discussions, and competition.

In my Game Design course, I ask the students to build a complete working game engine from the ground up, and then build a playable game in that engine. I am very proud of this assignment, as it forces students to understand the inner workings of the game loop, framerates, linear transformations, and some computational geometry.

I am also quite proud of an assignment given in the Human Computer Interaction class (Spring 2018). At that time, I was involved in a research project investigating the degree of gamification usage among mental health apps. My colleagues and I invited the students in my HCI course to help us collect data on these apps. I gave training on heuristic evaluations in HCI, and taught them a model for gamification that we developed. The students then downloaded various mental health apps and rated each according to the model. Their efforts led to a publication in the Journal of Medical Internet Research, and helped show the students how HCI techniques can be used in concrete research projects.

### Teaching Evaluations and Accolades

Since the Fall of 2013, I’ve taught 3,293 students across 35 primary sections (not including capstone students, etc.). My average enrollment is 94 students, with my largest containing 207 students. I have also been active in engaging students in other coursework, including multiple independent studies and capstone projects per year (about 1-3 per year), and several small experimental special topics courses. I’ve also supported students interested in teaching by advising several student taught courses, including ones on artificial neural networks and technical interviewing skills.

On average, my instructor rating is 4.47 / 5, and has been above the SEAS mean for every course except one. My students mention my kindness, approachability, and communication among my positive attributes. I received the *ACM Professor of the Year Award* following the 2013-2014 school year. I was also awarded the *Hartfield Jefferson Scholars Teaching Prize* in 2017.

### Teaching Conclusions

I sincerely believe that my ability to teach is one of my strongest assets. I am passionate about communicating clearly to students. I love learning new things every time I teach a course, and infusing my courses with new information every semester. I want to discover innovative course structures that help all students find success, and I hope to disseminate these findings beyond the UVa community.