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Teaching Statement

I first discovered that I enjoy teaching when, as an undergraduate, I worked as a math teacher for an SAT preparation course. The curriculum was fixed, so my responsibilities as an instructor were to present the required subject matter each week, proctor practice exams, and review homework with the students. These tasks would be easy to accomplish with very little preparation, but I found that I felt I could do better. Instead, I spent time each week preparing solutions for the homework problems, including the concept each problem was testing and the process by which to solve it. I also found myself thinking about examples to use during class that may help the students grasp the ideas. The mathematics on the SAT exam are by no means the most thrilling topics to review, but I realized that I was excited about helping the students and it was incredibly rewarding to see them improve throughout the weeks of the course. I taught the course during two different semesters. During the first semester, I noticed that the students seemed to understand concepts better if we worked through multiple sample problems that used the same idea in different ways. Consequently, during the second semester, I made sure to include at least two very different examples for every math concept we discussed. This teaching experience helped me discover in practice that the time invested in repetition pays off for student learning, and that the time invested in paying attention to student response is beneficial to both the students and the teacher.

More recently, I gained teaching experience in a subject related to my research area of hydrology: I served as a teaching assistant for an undergraduate course in fluid mechanics. My responsibilities were two-fold: aiding in the classroom portion of the course by holding office hours and grading written homework assignments, and running the laboratory portion of the course by demonstrating the use of lab equipment, guiding students through the activities, and grading their reports. During this experience I learned several things about the nuts and bolts of teaching. For instance, regarding assignments, it is critical to set clear expectations for student work and to follow through on those requirements. A correct answer on a homework assignment is not useful if the student has not shown that they understand the process of arriving at that answer. A calculation on a lab report is not useful if the student does not discuss what the result means and how it is useful. Although the professor of the course gave the students lab report requirements in the beginning of the semester, after the first lab report I emailed the students a document explaining some of the requirements in detail. Also, if I noticed a lot of students making the same mistake on an assignment or missing a concept on a lab, I would send a message to the class via Blackboard giving my best explanation and reminding them that they could always ask me for further clarification. I also tried to convey that being thorough is not only a skill that would improve their grades, but also one that would help them in other studies and in their careers beyond college. Throughout the semester, I did start to see improvements in the overall quality of their work. This experience taught me that progress students make is closely related to the effort of the instructor. Had I not taken the time to familiarize myself with the hydraulics equipment before the laboratory sessions and communicate with the students about their work, they may not have understood the concepts as well or been able to improve as much throughout the semester.

Based on these experiences, my teaching philosophy is much like my learning philosophy: you get out what you put in. The most memorable courses I have taken have been challenging and required me to really work to earn my grade. While these courses required more of my time, they were the most rewarding. The instructors for these courses were also organized, approachable, and genuinely interested in my mastery of the subject matter. Therefore, I plan to build the courses I teach around recreating the rewarding and memorable experiences I have had. The first component of such a course would be lectures that are clearly organized with thorough notes. Instead of simply writing formulas or derivations on the board, I will attempt to help the students understand the problem that needs to be solved, the process taken to reach a solution, why the results are meaningful, and how they can be applied. Additionally, while it is tempting to cram as much information as possible into lectures, I will be sure to encourage students to ask questions throughout class. I have also found that in-class review of previous material helps promote understanding of the material and helps encourage questions. Therefore, I will also make time for such review through activities such as small group exercises, short quizzes, or asking students to explain important concepts in class. Since

students are sometimes afraid to speak up in class, I will use electronic tools such as live Google forms to allow students to provide answers to questions I pose or to ask their own questions in real time. I will also encourage students to collaborate with each other by using the discussion tools available on sites like Blackboard and Sakai. Furthermore, assignments will be designed to be meaningful; rather than just needing to plug the right numbers into an equation, I will lead students through part of the derivation of the equation or introduce a practical application of the concept. These teaching tools will require more participation and effort of the students, ideally leading them to gain more from the class.

In science and engineering, the applications of concepts learned in class are just as important as the theory. Additionally, seeing how a particular concept plays out in the real world helps students grasp the general ideas at hand. Therefore, in each course I teach, I plan to incorporate activities that demonstrate the concepts shown in lecture. For example, when teaching an introductory course on physical hydrology, I may arrange for a field trip to a local stream so students can take measurements for the parameters in the Manning Equation for open channel flow. In a more advanced course on groundwater hydrology for upper class undergraduates or graduate students, I would design a lab or assignment in which students learn about groundwater models by changing input parameters, observing resulting flows, and relating changes they see to the governing equations of saturated flow in porous media. As a student, I found that exercises such as these made courses more interesting, helped me remember important concepts, and helped bolster my interest in hydrology as an area of study. As a teacher, I hope hands-on activities have a similar effect on my students.

My progression as an instructor is measured primarily by student performance and course evaluations. I will feel that I have accomplished my goals as a teacher if, on final exams or projects, students can demonstrate improved problem solving skills and an understanding of how to approach different types of problems, even if not all of the answers are correct. In other words, my main goal for my students is that they progress as thorough, independent thinkers. Additionally, evaluations submitted by students at the end of the course will let me know if they felt like they learned anything and if they would rather the course been different. I may, depending on the standard evaluation, request additional information from the students about which learning activities they felt were most useful and if there were concepts they struggled with. I can then make informed changes to how I teach the course in the future, much like how I adjusted my strategy of using examples in the SAT math course.

I also believe that mentoring is an important part of success in higher education. Not only would I be available to students for questions outside of class, but I also plan to participate in student advising either on an individual basis or as a faculty advisor for student groups. As a student, it is helpful to have a faculty member to speak to about experiences at the home institution and at other institutions, and about academia or industry in general. Hopefully, I can build relationships with students that will help them make decisions about their lives outside any course I may be teaching.

Overall, I see my role as a professor as a multi-faceted position that requires teaching, listening, mentoring, and continual growth. This philosophy is based on my experiences as a learner and evaluations of instructors I feel have been successful. I would like for my students to learn about the process of problem solving and that science and engineering are about a gradual progression of gathering information and making new discoveries. I will encourage inquiry and the expression of new ideas, whether it is in the classroom or in other settings. As a mentor, I can be a resource to students, hopefully aiding those who might otherwise fall through the cracks and not continue on to achieve their academic and career objectives. My overall goal will be to help students discover that they are capable of making meaningful scientific contributions as long as they are willing to invest the effort.