TEACHING STATEMENT

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Before I started grad school I had already taught several recitations during my bachelor and master studies in Germany. All of them were recitations for more advanced, proof-based classes like Linear Algebra and Discrete mathematics and so the concept of teaching a service class posed a whole new set of challenges for me as a teacher. For myself, seeing the abstract, underlying structure of an object and understanding its properties is motivation enough to pursue mathematics but I realized quickly that in service classes most students incentive for learning mathematics can be quite different and is often more related to the real-world applications of Calculus. Since then I have taught a multitude of service classes and recitations and I had the opportunity to experiment with different teaching styles which helped me to develop methods to excite students about the material and encourage them during their learning process. The experience and techniques I have obtained during my graduate studies have enabled me to tailor my teaching to a wide variety of students and to provide engaging classroom experiences, convincing students of the beauty and necessity of mathematics.

What has been most successful for me are recitations where I was able to engage my students actively, instead of a lecture where students can lean back and tune out. I have since then developed a teaching approach based on a flipped classroom. A typical recitation for a service class would look as follows. I start my recitation by reviewing the topics that have been covered in class that week, focusing on examples rather than abstract concepts. This initial review session is to ensure that the students have a rudimentary understanding of the topic and are able to work on problems on their own or in groups. While it can be difficult to get feedback from students by asking questions, polling has been a successful method for me to generate student engagement. It also allows me to gauge the level of understanding my students have of the subject. After the initial review, I assign a series of problems and encourage the students to work on them, either on their own or in groups, while I go from group to group and support the students in the process. By seeing the students thought process while trying to solve a problem, I can recognize struggling students effectively and focus my attention on them. From my experience, a large percentage of students have difficulties applying the abstract concepts taught in class to actual problems. Often the students are overwhelmed by complex word problems and do not know where to begin; a problem that is difficult to address in a lecture and more easily in a one on one discussion with a student. Furthermore, concentrating on individual students allows me to be inclusive and adapt to special needs. I conclude the recitation by discussing the problems together, ideally a student volunteers to demonstrate their progress. At this stage I try to be very encouraging, even if the students only have partial solutions, I try to open a discussion and guide the students to a complete solution. Giving students a voice in a discussion is also an opportunity to foster a diverse learning environment.

The above recitation I have outlined comes with its own challenges. From my experience, most students are used to a passive classroom environment. In particular in the beginning of a semester it takes considerable effort to bring the students out of their shells. Nonetheless, I have seen a drastic change in students class room activity in a matter of weeks, which has led to very engaged class room situations. In more advanced, proof-based classes my approach is similar, still centered around engaging the students but the focus shifts towards closing the gap between theory and practice. A key issue I have encountered is that students struggle applying abstract theorems to specific examples. In this situation I try to apply an inquiry-based approach. Without recalling the theory first, I start by guiding the students through a basic example and from there let them guess what the general statement is. For example, I gave my students several different graphs and asked them to construct Eulerian paths. Afterwards the students guessed the correct statement of Eulers circuit theorem and were interested in the actual proof.

I understand that progressing from teaching smaller recitations to large lectures poses different challenges and not all techniques I have listed are applicable in large class settings. Nonetheless, I am looking forward to adapt and improve my teaching skills to those new challenges. Interactions with other teachers are invaluable in this regard and I hope to contribute to an engaging and supporting exchange among teachers.

In the future, I am looking forward to continue my current teaching activities while also participating in new ones. For example, I would like to engage in one-on-one mentorships of undergraduate students. While my mathematical research is often very technical, special cases can be rephrased in elementary and combinatorial terms, which presents opportunities for undergraduates to explore research activities. The more combinatorial problems are also amenable to computer experiments, which can provide a very stimulating and interesting way for undergraduates to be introduced to research. Besides deepening my engagement in undergraduate teaching I would also like to teach a graduate course.

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