TEACHING STATEMENT

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I enjoy teaching math because it presents so many pleasant surprises. Math can be fun, and many people enjoy math without realizing it. There is always a payoff to be found, and good math teachers find ways to guide students towards this end. I also consider teaching to be a complement to my research. Although research is ostensibly about insight, a career in research requires the strong communication skills necessary for giving talks and writing papers. On the other hand, teaching, which is ostensibly about communication, requires insight on the part of the educator, because teachers need to figure out what motivates their students, which explanations will make the most sense to them, and what misunderstandings might be holding them back when they get stuck.

Early Teaching Experiences

Teaching at UChicago. My earliest teaching experience was as a teaching assistant at the University of Chicago's SESAME program, which provided continuing education to middle school teachers from Chicago Public Schools. The program focused on problem-solving and abstract reasoning over rote memorization, and was a powerful influence on my teaching philosophy. I assisted in classroom projects for a class in the history of mathematics that focused on proofs, I led a regular discussion section directly with professional educators who were decades older than me. This experience taught me that education should, to the extent possible, be framed around a process of discovery, even if it is a discovery of something that is already known.

Private Tutoring. After college I hired myself out as a private tutor. Most of my students were high schoolers in geometry, algebra, and calculus, but some where graduate students looking to fulfill math requirements in economics, public policy, and computer science. This gave me the opportunity to learn how to teach a variety of subjects and age groups. Some of my students stayed with me for years, so I had an opportunity to watch them improve over long periods of time. I managed to turn a D student into an A student and an F student into a B student. My biggest achievement was in encouraging my students to believe they could do the work. Many of them went from looking at their homework and freezing at the first step to being able to work out most of their problems without my direct input.

Teaching at the University of Illinois at Chicago

Teaching Assistant at UIC. The bulk of my teaching experience has been at the University of Illinois at Chicago, where over the course of six years I regularly served as a teaching assistant for an assortment of classes, including different levels of basic algebra, calculus, and linear algebra. As a TA I led discussion sections, graded quizzes and tests, held office hours, and occasionally met with students on my own time. At UIC I learned how to teach as part of a large institution, where education is a collaborative task and depends on the organization of many people.

UIC is one of the most diverse schools in the United States and is a federally designated Minority Serving Institution. It serves a large number of students from underrepresented backgrounds, many of whom are the first in their families to attend college. I occasionally had the chance to have conversations with my students about their lives outside of math class, either after office hours or when I inadvertently rode the train with them. Many had numerous responsibilities aside from their studies. They worked part-time jobs, commuted from the suburbs, and cared for family members. I understood that their performance was affected by the circumstances in their lives, and that educational institutions must see after the well-being of their students in addition to providing effective instruction.

The Tutoring Center at UIC. A major component of teaching at UIC was the Mathematical Sciences Learning Center, which was a tutoring room where teaching assistants held their office hours. In the MSLC I could be called upon by any student to assist with an array of subjects that I had never been assigned

to teach, including differential equations, basic statistics, and mathematical proofs. Oftentimes I would be working at one table with four or five students, all from different classes, making rounds between the students as they each worked independently. I was partially responsible for explaining the material, but I acted more of all as a coach. My primary task was to help the students push past their immediate confusion and to break their work in to manageable chunks. I excelled in this setting, and many students whose classes that I did not teach would make a routine of visiting me during my office hours.

Lecturing at UIC. I held two lecture positions while at UIC. The first was in UIC's Summer Enrichment Workshop, which was an intensive five-week course aimed at students who were to matriculate at UIC in the fall but were behind in their basic high school algebra. During the program I acted as a lecturer, explaining the basics of each new concept, and also as a tutor for individual students and small groups. This was a new level of responsibility, especially because I was running the first class that these students would be taking at UIC, and it was a challenge because the students were already struggling academically. My other lecture position was for third-semester calculus, which covered topics in vector calculus, like partial derivatives, multiple integrals, and Lagrange multipliers.

Outreach at the University of Vienna

Thesis Mentoring. In the spring of 2019 I mentored a student at the University of Vienna with his bachelor's thesis in mathematics. I helped him choose a topic that was interesting enough and yet manageable enough for a bachelor's thesis. We had weekly meetings in which we discussed the material and I answered his questions, and I helped him edit his thesis. At last, I evaluated his final presentation which, as the other instructors agreed, went well enough for him to receive the highest possible mark.

Skype Appearances in High School Classes. During my time in Vienna as well as afterwards, I made guest appearances in my friend's Theory of Knowledge class via Skype. ToK is a standard component of the curriculum of the International Baccalaureate for high school students, and it considers the different areas of knowledge under a single umbrella. I appeared in these classes as part of their math unit. I presented some accessible examples of higher mathematics, discussed the differences between mathematical research and the math that they were learning in high school, and took questions from the students.

Teaching at the University of Freiburg

Seminars in German. At the University of Freiburg, I have had the opportunity to assist with student seminars in infinitary combinatorics and knot theory. These seminars centered around student presentations, so the format was a completely new setting for me. My work consisted of meeting with students to answer questions and coach them on their presentations. Moreover, the seminars were in German, and although they had the option, many of the students chose to consult with me in German rather than English.

High-Level Lecture Courses. I have also had the opportunity teach my own lecture courses inside my specialty of mathematical logic: these are at the master's-level, and so they are taught in English. In Freiburg's system, one needed to advertise the courses to attract students. Then I needed to plan much more complicated lectures than in my previous experience. The courses I have taught are: forcing and large cardinals, models of Peano arithmetic, descriptive set theory, and applications of set theory to algebra and topology.

I have received positive evaluations for my teaching in Freiburg. One evaluation for my descriptive set theory course reads as follows: "The instructor was very enthusiastic and was able to motivate me as a listener. His explanations on general ideas of the proofs together with pictures were very helpful for understanding. I think the topic of the course is extremely interesting and the exercises are mostly helpful. I also like the atmosphere in the lecture, I never hesitate to ask any questions because I feel like they are very welcome." An evaluation for my applications course reads: "Love the general setup of the course; seeing selected applications of set theory throughout various mathematical fields is very rewarding."

The courses I have taught have had a demonstrable impact. Many of my students returned to attend my later courses. This year I posted a preprint with Hannes Jakob, who is currently a PhD student at the University of Freiburg and one of the participants in my first lecture course. I am also in the early stages of mentoring a master's thesis for a student who attended my most recent course.