

Teaching Statement

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As an academic working in a leading educational institution, I consider educating people a fundamental responsibility of my job. My role is to educate as many people as possible; to provide them with the best possible knowledge and skills; and to adopt the best possible educational methods to support their learning.

I am a strong believer in the synergistic role of teaching and research. By doing research, we are constantly informed by the latest advancements in our area of expertise and can integrate them into our teaching to provide cutting-edge and rigorous education for our students. By teaching, we develop the ability to identify a broader understanding of our research and can more easily identify knowledge gaps that need to be filled. Over the years I have greatly benefitted from this synergy and have numerous examples of research ideas I have developed thanks to stimulating interactions I had with my students.

My activities as an educator are guided by three main principles: (1) serve a broad and diverse set of learners; (2) turn research into learning experiences; (3) experiment, adapt and innovate with teaching methods. In the following I am going to provide more details about each of the three principles.

Serve a broad and diverse set of learners. The knowledge and skills I teach as an academic have the potential to impact the intellectual growth of a multitude of people across several boundaries including: culture, geography, learning style, age, gender, and career stage. In addition to my graduate and undergraduate courses I have over the years participated to a number of initiatives to broaden the horizon of my teaching activities. I have participated to K12 initiatives (through the NYU K12 program) to teach high school students over the summer. I have included undergraduate students in research through the NYU Summer Research program (hosting students from NYU global sites such as Shanghai and Abu Dhabi). I have developed a popular online specialization on Information Visualization in Coursera, a leading provider of Massive Open Online Courses (MOOC). Through the course I reached tens of thousands of learners across the globe providing them with high-quality content covering skills that are highly valued. With the advent of new communication technologies there are endless opportunities to reach a diverse set of learners at different stages of their education and career. It is my intent to keep expanding my offering as an educators and to explore new avenues to expand access to knowledge and skills.

Turn research into learning experiences. As mentioned above, I am a big believer in the synergy between research and teaching. The most direct expression of this principle is the role I play as a PhD advisor. My research activity is modeled around an apprenticeship model. My students learn how to do research by working actively on research project as soon as they join my lab; typically by collaborating with more senior students at first and then becoming increasingly independent. The biggest satisfaction of my work as an advisor is to see my students grow and become intellectually mature and independent. At NYU I graduated a total of four students and I am currently advising an additional four. My mentoring philosophy stresses rigor and impact. I aim at imparting a love for careful work with the potential of having an impact on the research community and on practitioners. For this reason, all my students include in their work a mix of experimental and applied work. The experimental work typically involves a combination of user

studies and controlled experiments, whereas the applied work includes the development of open-source applications to meet specific needs of a group of domain experts. I find that the varied experiences my student go through during their doctoral work, make them well-rounded thinkers ready to solve a broad set of scientific problems in the real-world.

Turning research into learning experiences also involves translating and disseminating research to a broad set of practitioners that work in data science and data visualization. I strongly believe that maintaining such a dialog is important not only to make sure research gets adopted by practitioners but also to learn more about what kind of problems exist in the world. To this purpose, I have over the years developed a number of strategies to facilitate this type of exchange. By far the most successful initiative has been *Data Stories*, a podcast on data visualization I have founded together with acclaimed visualization designer Moritz Stefaner in 2012. The podcast features interviews with practitioners and researchers working with data-related problems and gives our listeners an opportunity to learn about their new ideas in the data visualization space. The show has gained increasing popularity over the years and it is today widely considered one of the top data science podcasts (see mentions in my CV). As of today, the podcast has a listenership of about 15,000 listeners per episode and a total number of 160+ episodes published (as of May 2021).

The opportunities for broad dissemination of research are endless. My plan for the future is to keep developing opportunities to engage with a large audience of practitioners and aspiring data visualization experts. As the field of visualization grows and gains in popularity, it is crucial for researchers to accelerate technology and idea transfer and to provide learning experiences grounded on solid research. While basic material to learn data visualization online has grown considerably in the last few years, there is still a very limited offering for practitioners that want to acquire more advanced skills. One of the projects I am planning to develop in the near future is a series of online seminars targeted at data visualization practitioners who want to hone their skills with highly advanced research-based material.

Experiment, adapt and innovate with teaching methods. In my career as an educator, I spent considerable time and effort educating myself on how to best teach my students and in experimenting with a variety of solutions. Teaching information visualization is a challenging task. Lecturing students on existing theories, guidelines, and techniques, does not automatically translate into acquired skills. For this reason, most of the changes I have implemented over the years pertain to finding the right pedagogical strategies to help students develop the necessary practical skills. This challenge led me to learn more about education research and to experiment with different pedagogical approaches. Two methods in particular yielded very positive results.

The first one is the assignment of nontrivial visualization projects that students develop with assigned virtual “clients”. The assigned clients are domain experts at NYU and in New York City who are willing to share their data and to mentor a group of students from the class. This approach exposes the students to challenging situations that simulate real-world conditions they would face in industry and, at the same time, empowers them with the excitement of solving a real problem from which someone can benefit. Over the years my students developed projects for humanitarian organizations such as UNICEF and the United Nations; for NYU professors in need of data analysis tools; and for various businesses in New York City. Some of these projects also resulted in students obtaining internships in these organizations and, in some cases, also being hired after graduation.

The second method I have been experimenting with is the “flipped classroom” model, which I started implementing in 2017 and I have used since then in all my courses. In this model, students acquire the necessary content through video lectures and readings at home so that they can spend their time in class solving exercises and developing projects with the instructor. This method gave

me the opportunity to spend much more time providing practical advice and support to the students and working on constructive criticism of their work. The feedback I received from students has always been extremely positive and I have personally observed big improvements in the learning outcomes.

My experience with flipped classroom teaching and online courses has been particularly helpful in the recent months when teaching has been moved online due to the covid19 pandemic. In these months of remote teaching I have learned new strategies to work with students and to deliver high-quality teaching. One open challenge I plan to address is to increase engagement and participation in remote teaching. In the last semester, I started experimenting with remote activities students had to develop in groups, but I believe engagement can be achieved in many different ways. One of my future teaching goals is to develop an open-source set of learning activities to use with my students and to make them freely available for educators who want to adopt my same strategies.