Teaching Statement

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Once one knows something, it is hard to remember what it was like not to know. How to explain something such as to structure thoughts, piece by piece, until words turn into knowledge? When a student struggles understanding some concept, the teacher must find different ways to explain, understand what obstacles stand in the way in a student's mind, and find ways around them. It is not easy, but I find few things are as satisfying as seeing the light in a student's eyes when, all of a sudden, they "get it!" I always have been passionate about teaching.

Whatever I end up doing in my life, I want some sort of teaching to be a part of it.

Teaching

Past and current experiences

I studied in one of the French schools called École Normale Supérieure (ENS), which are universities specifically dedicated to train researchers and university teachers. In addition to my Bachelor's and Master's programs, I followed a one-year training for a national teaching exam (the *Agrégation*) that is required for certain university positions. This training provided me with **solid pedagogic foundations** (*e.g.*, how to define learning objectives and design a corresponding teaching sequence). In 2013, I passed the Agrégation while ranking 1*st* in the *Engineering Sciences* category (Mechanics major).

The following semester, I had my first professional teaching experience. I taught a second year university-level Mechanics course on kinematics, kinetics, and dynamics at the Institute of Technology[1] of Tremblay-en-France (France) where I was responsible for lectures, exercises, and labs, amounting to an average of 4h/week of class time. It was a very intense (and time-consuming!) experience for which I received great feedback from my students. It also convinced me that I want to spend more time in a classroom.

When I joined ETH Zurich for my doctorate, I was happy to be a teaching assistant in several lectures.[2] I always started the exercise or lab sessions with a quick recap of the key notions, trying to present things from a slightly different angle than the professor had done in the lecture, thereby offering **effective redundancy**. In parallel, I attended courses to further improve my teaching skills.[3]

As a postdoctoral researcher, I am currently responsible for the coordination of a Master course on *Advanced Topics in Communication Networks*. In addition to renewing the course content, we are adapting the entire course to a fully-online format—yet another new and very interesting challenge! As online teaching is likely to become a "new normal," I find very important to **revise our teaching approach** to foster students learning in such an online format. While I enjoy discovering new tools for online teaching and the overall course organization tasks, I do miss the student contact as both lectures and exercises are given by others.

[1] These are comparable to the Swiss Universities of Applied Sciences.

[2] Embedded Systems
Low-Power System Design
Discrete Event Systems

[3] Learning to Teach
Mobile voting and feedback systems
Speaker, audience, message – Making connections

Philosophy

My teaching philosophy is based on three pillars: get students to practice, ask and react to feedback, and adapt to the students' needs.

Practice It is key that students get to practice the notions they aim to learn. This is a well-known concept in pedagogy: a good learning objective starts with an active verb describing what we want the students to be able to do after a session. In the context of computer science, presenting the concepts and protocols is not enough; I believe students must implement these protocols and run them to really understand the underlying algorithms and their limits.

Feedback Student feedback is essential. Exercises, quizzes, or other interactive classroom activities allow to track the students' progress towards the course learning objectives. If a key notion has been misunderstood by many, finding it out only at the final exam is the teacher's failure. In addition, asking students for their opinion about the course management, teaching style, and learning activities offers valuable feedback—they might want more of this and less of that. The teacher's job is not to do what they like, it is to provide students with what they need in order to learn efficiently; which leads me to my third pillar.

Adaptation It is the teacher's responsibility to adapt to the students' needs and capacity. Students are all different; some efficiently learn via textbooks and written materials, whereas others understand things mainly by applying them. It really struck me when I taught the Mechanics course in 2014 where I focused on the lectures and exercises, during which most students had a hard time following. I was dreading the lab sessions, where the same students would have to spend four hours doing experiments that I personally found not-so-interesting. To my surprise, they were extremely engaged and I believe they understood much more from the labs than anything else. That was what *they* needed. A good teacher must understand and adapt to the type of students they aim to teach to.

Future activities

My doctorate and current research activities relate to networked systems (wired and wireless; embedded and computer systems) and I have a background in discrete event systems and control; I therefore feel confident that, as a junior faculty, I would be able to teach courses related to embedded systems and software as well as introductory and advanced lectures in networking (in either **English** or **French**); I would also like to organize reading seminars to embed some of the latest research into the students' curriculum.

Furthermore, I believe it is crucial for scientists to be able to describe and present their work efficiently. Two core skills come to mind: **visualizing data** and **delivering presentations**. Unfortunately, existing soft skill university courses targeting those are scarce and often too abstract. Scientists are not designers; they benefit most from a concrete and rational approach to effective communication. That is something I work a lot on with the students I supervise; I would love to scale this up and offer a course on the topic.

Finally, I would love to give an "**Introduction to Research**" course initiating students to practical aspects (*e.g.*, bibliography, reviewing and writing, project management) as well as presenting and discussing what is known today as "Open Science." This is something very close to my heart[4] and one of my main motivations to aspire joining EPFL, which has been at the forefront of this movement for several years now.

[4] romainjacob.net/pledge-to-open-science

Supervision and Mentoring

Supervising students is hard and something doctoral students are typically not trained for. Luckily, ETH does offer a number of courses on supervision, which helped me progress and feel confident as a supervisor.[5] During my doctorate, I supervised multiple semester and master theses.[6] I always tried to offer students a lot of feedback and advice, not only on the project per se, but also on *e.g.*, their final presentation—something they always appreciated a lot. Two students came back to do their Master's thesis with me while two others carried on to pursue a doctorate; so it seems that I somehow succeeded in transmitting my passion for science! Here are some quotes from students I supervised.

[5] Supervising students – Dealing with roles and relationships; Facilitating meetings and workshops

[6] romainjacob.net/students

> From the beginning, Romain demonstrated an outstanding dedication to his work as well as excellent organisational and pedagogic skills. While always keeping the bigger picture in mind, he enabled me to gather my own experiences while guiding me with his wealth of technical knowledge and strong personal commitment. His friendly appearance, structural approach and supporting advice enriched our meetings and made working with him a truly enjoyable experience.
> —Andreas Biri

> (...) During the project, Romain proved to constant source of valuable input, strengthening my ideas and providing advice how to integrate them into the project as well as constructively guiding me when I was unsure on how to proceed.
> —Alexander Dietmüller

As a postdoctoral researcher, I am actively co-advising two doctoral students. Helping to nurture their research skills is one of the most satisfying part of my job at the moment.

As a faculty, one has the (daunting) responsibility to select suited candidates for doctoral studies and support them along that difficult journey. To maximize chances of success, I believe it is paramount that mentor and mentee have **aligned expectations**. For example, some students are more independent, some need more close-looking over their shoulder; it's all okay, but what the mentee needs or wants must match my own supervision style to make our **collaboration** a success: as group leader, I want my students to **work with me**, not for me.

I consider mentoring students a key part of a faculty's job; after all, academia is about "higher education." We do have a lot of important work to do, but that should never be at the expense of people and their opportunities to learn and grow.[7]

[7] Paraphrased from Jen Heemstra.

I would take that as my future group's motto.