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## Immerse yourself for intensive learning

By Elisabeth Pain Jan. 31, 2018 , 5:20 PM



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Katharina F. Heil loved her work studying the genetic and molecular underpinnings of Parkinson's disease. But the final-year doctoral student at the University of Edinburgh in the United Kingdom also wanted to find ways to help patients more directly. So when she came across a [weeklong program](#) about [citizen science](#), it seemed like a great opportunity to learn how to include patients in her work and nudge her research toward personalized medicine. It didn't hurt that the program would gather Ph.D. students from all over Europe and be held at the University of Zurich in Switzerland, offering a fun travel opportunity. (Her travel costs and €500 attendance fee were covered by her Ph.D. grant and doctoral school.) And with Heil in good shape to wrap up her thesis, her supervisor saw no reason to object.

So, in the summer of 2017, she set off for a week in Zurich. The experience, which included an introduction to the core principles of citizen science and working with other participants to design and pitch a proposal for a citizen science-based project, was "very inspiring," says Heil, who defended her thesis in December and is currently a postdoc in her Ph.D. lab. "It definitely opened my mind" to incorporating citizen science into her research—and gave her the tools and network to make it happen, she adds. "It's not just the content; it's really the whole package and the variety of people one can meet" that make immersive courses enriching, enjoyable experiences.

Intensive training programs like the one Heil attended can be great ways for early-career scientists to learn about nontraditional approaches to conducting science, hone specific research skills, get a crash

course in a new field, [explore interdisciplinary research](#), or use focused time to make headway in their work. The names, logistics, and availability of such courses vary: Heil's doctoral summer school was only open to Ph.D. students at certain European institutions, for example, while others are open to applicants at various career stages from around the world, and many U.S. universities offer boot camps and bridge programs as part of their doctoral programs. But most initiatives share the goal of providing an immersive environment to equip participants with specific knowledge and skills over a few days or weeks—and hopefully offering a nice change of pace from the daily grind of research and some fun along the way.

## Crash courses a la carte

A common goal of short intensive learning experiences is to boost training in core research skills. Harvard Medical School, for example, offers life sciences graduate students a [range of short-format skill-building courses](#), including the 2-week [Boot Camp in Quantitative Methods](#). Boot camps are particularly useful for this topic, says Melanie Stefan, who helped run the camp in 2013 and 2014 when she was a curriculum fellow there, because not all biology students are in a position to pick up statistical and computational skills in their labs, she says. There are many online courses available, but learning from scratch on your own can be hard.

The boot camp—which consists of approximately 50 hours of mandatory lectures, discussions, and exercises, with additional optional half-day sessions—aims to bring students over a knowledge and confidence threshold so that they can start applying quantitative and programming skills in their work. “It’s not about the details of what we teach them,” says Stefan, who today uses computational methods to investigate learning and memory as a lecturer (equivalent to assistant professor) at the University of Edinburgh. The main outcome that Stefan wants to see is that “if [a Ph.D. student] has a question about her data analysis, she knows enough that she can read a book chapter or a paper that explains that analysis and understand it,” or she can go and find help, Stefan says. By that metric, the boot camp has been successful: In surveys, [students reported](#) feeling better prepared and more inclined to use quantitative and computational methods in their research after taking the course.

Other boot camps aim to create structured time and space for participants to focus on specific aspects of their work while also instilling valuable skills. Queen's University in Kingston, Canada, for example, offers [approximately weeklong dissertation boot camps and retreats](#) with daily blocks of writing time interspersed with recreational activities, as well as workshops and one-on-one sessions about setting realistic goals, creating a conducive environment and mindset for writing, and strengthening one's writing style. “Those camps really opened my eyes” to what is required for effective writing, says Leslie Holmes, a sixth-year community ecology Ph.D. student at Queen's University who participated in three immersive writing programs last year. During an on-campus boot camp in February, she focused on getting her first chapter's data entry done; over a retreat in June she wrote a first draft of her introduction; and, following discussions with her supervisor, she spent her last retreat in August rewriting her introduction. “Without those boot camps, I probably would still be working on it,” Holmes says. “Each [experience] was kind of a building block.”

Interested students need to register for the boot camps, and priority is usually given to those who are closer to completing their degrees, but the university typically pays the cost to attend.

In other cases, an immersive course may help provide a foundation for a new research or career direction. For British economist Nikhil Masters, going to Heidelberg, Germany, in 2014 for a [2-week summer program in neuroeconomics](#) helped him find a way back into research after having spent 3 years post-Ph.D. focused on university teaching. He had been looking for immersive courses to meet new people and spark research ideas, and the course did just that. Through lectures and discussions, Masters broadened his exposure to psychology, neuroscience, and medicine, providing a foundation for future interdisciplinary work. The program culminated with participant teams developing transdisciplinary projects, with the potential of nabbing a €2500 grant to pursue the work—and Masters's group was one of the winners. Masters doesn't know exactly how much of a role this played in securing his current postdoc 1 year later at the University of Manchester in the United Kingdom, where he studies the role of emotions in economic decision-making. But he believes that the course outcomes—which also included publishing a paper with a fellow participant, an M.D. from Brazil—were important contributors.

## Realistic expectations

Several studies echo a [high level](#) of [satisfaction](#) among short course participants and found [measurable impacts](#), but it is important for students to come in with realistic expectations and make an effort to further their learning after the program is done. As David Feldon—a professor at Utah State University in Logan who studies how science trainees develop research skills—explains, decades of psychology research have shown that “people learn best by practicing and studying and experiencing things in smaller time increments distributed over a longer period.” Participants in short intensive learning experiences may feel that they get a lot out of them, but Feldon and his co-authors [have found](#) that the skills of doctoral students who participated in a boot camp or bridge program the summer just before or after their first year were no better than those of nonparticipants during their first 2 years of graduate school.

That's not to say that intensive learning experiences have no value, Feldon acknowledges. “If the expectation is that [a participant] might be exposed to something that's new and interesting and provides an avenue towards future learning opportunities, then yes, I would say that's worthwhile,” he says. These experiences may be particularly useful for those who “are trying to figure out whether or not this is something that they are interested in pursuing further.”

Participants in skills-based courses can also increase their chances of retention and future progress by actively seeking out additional exposure and opportunities to practice, Feldon and Stefan agree. Feldon encourages students to pick courses that offer further learning opportunities after the program is done. At Harvard Medical School, Stefan ran a helpdesk where graduate students could come in with their quantitative problems. Even if those types of resources and opportunities aren't available, anyone can build on newly acquired skills by integrating them into their research, Stefan

says. Keeping in touch with fellow students and faculty members is also helpful so that they have someone to turn to for help, she adds.

Beyond the hard learning or progress on their project, participants in short intensive learning experiences can gain valuable experience. Simply applying and putting together a CV and cover letter is good practice for job applications, Heil says. Boot camps and summer programs often offer good opportunities for teamwork and networking. “Everybody is in the same mood and everybody is still a student, so it is a very natural way of learning how to network,” Heil adds. Many summer schools also give participants the opportunity to give presentations about their research. Informally explaining your science to other young researchers outside your discipline helps hone your oral and written communication skills, Holmes says.

Sometimes, the skills or knowledge picked up during short learning experiences are unexpected, and their value may only become apparent long after the course is over. As an undergrad, Stefan attended a 5-week summer course intended to prepare Austrian business and science students for working with Chinese colleagues, where she learned the importance of respecting hierarchy and giving others a chance to save face. “I thought I would never be able to apply [that experience], but it gave me some [people] skills that are really useful now,” says Stefan, who spends 12 weeks a year teaching at the [Zhejiang University-University of Edinburgh Institute](#) in Haining, China. Even in Europe, where working relationships tend to be less strict, the cultural experience helps her think about how she can make sure her interactions with others are respectful. “I think about it ... when I talk to a colleague, when I criticize something, or when we try to work out a problem,” which fosters pleasant, productive relationships, Stefan says.

With participants often able to attend for free or get funding support, the decision to attend a short intensive learning experience may come down to opportunity cost. Stefan suggests that prospective participants ask themselves what else they could be doing instead with that time. “Sometimes, it might be better to stay at home and write up your thesis or your next paper,” she says, adding that you should check with your adviser about when may be the best time for you to go, and where.

Potential participants may also want to factor in a consideration that can sometimes get lost in the day-to-day research routine: fun. Heil found that interacting with other graduate students and talking about their projects renewed her enthusiasm back in the lab. Many short learning experiences, and international summer schools in particular, are also meant to be enjoyable and offer opportunities for recreation. During Masters’s course, for example, participants were given relief from science-packed days with a city tour, a wine tasting event, a dance party, and a posh closing dinner. “It is intense,” Masters says, “but there are moments where you do feel, ‘Wow, this is a really exciting holiday with like-minded people.’”