On building a research lab, not starting it

If you are an Assistant Professor or about to be one, you probably have gotten lots of advice on how to start your own research lab. But, you might think about building a research lab, rather than starting one.

As a new Assistant Professor at a small, liberal arts college, I received all of the regular advice from colleagues with "established" labs on how to start my own. They told me that the winning formula was to essentially slave away until you received your first grant. However, the problem with this "start-the-lab" formula is that it depends on getting that first grant. I slaved away, but I was burnt out in two years with no grant in sight. The "start-the-lab" path was not going to work for me.

I ended up stumbling onto another path, quite accidently. I was talking to an enthusiastic undergrad at a poster session for a small, local conference. Surprised by the number of undergrads in her lab (20!), I sought out her advisor and asked him if he slept. He laughed and said that it was easy to manage 20 students because they managed themselves; the older ones trained the younger ones. I left this conversation thinking he was crazy, but I also started to think about what it would mean to "build" a lab to support 20 undergrads. And that simple switch, from thinking about a research lab as something you "build" rather than "start", made a difference.

When you "build" something, you start small and gradually increase your infrastructure, strengthening as you go. Thus, I embarked on a "build-the-lab" formula where I was only going to put effort into things that I thought would be useful over the long term. I started to ask everyone and anyone if they had any tricks for sustaining their research labs. And I got some amazing responses.

One of the earliest and best responses I received was from a postdoc who was running his own lab on a fellowship. He had been using an electronic lab notebook since graduate school and recommended it. I started using a program called Evernote, and was hooked. If the research lab is a house, then the electronic lab notebook is the foundation. It is the platform that allows you to increase the infrastructure in the lab so that the students can manage themselves. In Evernote, each student logs in to the same account and can see their individual notebook, but they can also see all of the "lab" notebooks. There are lab notebooks that contain experimental procedures, ones that have drawings of machined parts, ones that have safety trainings, and ones for each experiment. Students can search the notebooks, tag particular notes, update the notes, and copy "note templates" instead of writing every note from scratch. These note templates increase the uniformity of the notebook across many users, making it easy for groups of students on the same experiment to share data. Storing the shared data in a single cloud account (*e.g.* Dropbox, Google Drive) facilitates accessing this data from multiple computers. In this way, each student in an experiment can access the repository of data, and use it to answer their own particular question. This creates a foundation for building the lab since student teams can build knowledge over time and manage themselves.

Another great response came from one of my mentors in a chemistry department. She told me

that she recently had her newly trained students update all of the step-by-step procedures in the lab to a series of training videos. I liked the method because it meant that you could start small with a simple procedure and build up to something remarkable like a training video. That year I skipped my month-long training for new students and took a day to write a note with a couple of homework problems. Seven years later the students have updated this original note to be an intense 3-week training program that requires 3 hours of my time. The next year I skipped my intro meeting with thesis students and used the hour to write a note on what to expect during the thesis. Now this note has blossomed into a year-long syllabus for students to follow. It has "homework" that keeps the students on track for managing their projects and writing their theses. After these experiences, I started to apply this "update" framework to everything. If the lab needed something, I started a note on it and had the students build on the note to make it better over time. The students updated our procedures for group meeting, for shepherding papers to publication, and for purchasing items. This is an incredibly powerful framework, but it only makes sense if you are going to build your lab gradually.

At this point, I had the foundation and framework for building my research lab, but nothing really clicked until I started "building" the students as well as the lab. This was like realizing that a house needed a roof! I was giving a talk at a large, teaching college nearby and met an incredibly charismatic Assistant Professor. He talked about how he celebrated student milestones—end of training, end of first summer, start of thesis, and graduation. Since each student would celebrate the same milestones, they could see their progression and feel that they had a shared experience with the others in the lab. I implemented many of his ideas and began to build-in more—lab outings, lab paraphernalia, all-lab trips to present at a local conference. My goal was to try to give each student the same experience and then perfect on that experience with time, building in student retention.

I now have the foundation, framework, and roof for my research lab, but I am still working on the siding and plumbing. Are you building your research lab? If you are, email me your ideas. If not, think about one thing that you would like to do differently, and then take a small step toward building it.