Setting up your lab and obtaining equipment

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Guiding considerations

- Create a 'lab' in which your research group can complete selected critical tasks (make measurements, use computational tools, etc.) that are <u>essential to your research</u> with <u>high quality.</u> (This supports the students and well as your research goal.)

  Most equipment only works when it is used regularly AND students know how to use it (e.g. the lab has standard procedures established). Both lab culture and hardware equipment require focused effort to maintain high quality. For analyses that will be completed infrequently, more reliable results may be available commercially or from another outfit on campus.

Don't try to necessarily replicate the lab you knew in grad school. Carefully examine your situation, needs, etc. as you build [and stock] the lab. Replicate the parts of the lab that you need to get working, and then customize the rest for your particular situation and students.

I have decided to try to do some things well and to call on colleagues who focus on complementary tasks that we should be able to do, but don't have resources for. E.g., I work on sulfur and have the capability to work on oxygen. My good friend works on oxygen and has the capabilities to do sulfur. BUT I send my oxygen work to my friend and vice versa.

Try to follow the mantra of "do it well, so you only have to do it once".

- Be aware of YOUR time (=$$!) as well as the financial constraints

Balance time spent getting the lab going with other research priorities--don't let lab start up take all available time. Certainly a large chunk needs to be devoted to getting things going, but "a lab" (just like "a course") can easily become a black hole. Get it operative, not perfect….. As with all tasks, don't underestimate how long this type of work takes.

Where I think I made a mistake was that I overextended my ideas and spent <u>too much time</u> (and am still working on) setting up rather than on getting research done. I had been advised to set up something straight forward and use it to focus on work. I tried to do that with part of the lab and that has been very productive. I also tried to set up some more ambitious things and that has not. What would take me a few months of focused time as a post doc to build and trouble shoot seemed within reach when I started, but the time evaporated and the experience in building was not easy to transfer to students. In the particular case, I did not have enough money to get the exact equipment I needed (significant $$ short) so I thought I could build and modify interfaces to do what off the shelf pieces would. We have completed some of this, but it would have probably been better for me to find a way to get the money or rescope my plans and to spend the time on research tasks.

Don't underestimate how long it will take for a student to learn to make a quality measurement.

- Maintain your 'cool' - recognize that it takes time to get the lab to function and plan for this inevitability (within the realm of reasonableness). Remember that your lab facility is an investment for the institution and ask appropriate senior faculty to intercede if necessary and at strategic times.

Another thing that I think worked was to realize that different universities have different records for setting up labs (time, frustration, engineering) and that my peers were seeing many of the same difficulties. It helped my sanity to have advice from colleagues about knowing when to cut short my arguments, decide whether I had to come up with funds or could, and to move on. I know this applies with other things, but it also applied a lot with my lab set up.

Don't be afraid to ask the physical plant people to redo things if they haven't followed your instructions. Communicate as often and as clearly as you can to those who will wire, plumb, and/or build your lab.

Be savvy about saving

- Save money wherever you can and ask for help.

It worked when I asked people I knew who had either just started labs or who had old equipment for parts which I used for lab set up. Some others approached me and offered to transfer equipment.

Get to know your sales reps because they can frequently facilitate great deals, lightly used demo models, etc.

When evaluating lab procedures, always include labor in the cost of the procedure and ask that your research technicians and students do the same. Money spent on instruments and approaches that significantly decrease the per sample cost of an analysis is generally money well spent.

If there's any way you can reserve some fraction of lab start up funds, do so! Part of a new lab (and a career) is going in new directions, and it's nice to have a little pocket of funds to buy some equipment or analyses to head in a new direction.

Ask your chair to 'carry over' a bit of the $$ that you save in a flexible account that you can use to seed new stuff, pay a student, purchase something that you forgot to put on your start up list or that gets broken, etc.

Negotiate the ability to spend a portion of your start-up money on disposables.

- Smaller stuff that is less essential for an initial project can be purchased in bits and pieces, matching can (in some cases) be used to extend funds.

Moderately valued equipment 'upgrades' can be included in core research proposals to extend startup funds. One example is to purchase an essential piece of analytical equipment from core funds, but to include the auto sampler in your proposed project.

It also worked to use my start up as matches for equipment proposals that I wrote to federal, private, and university sources. I realize the rules have changed somewhat with matching funds.

When I needed equipment and did not have funds, but had support for other things, I contacted my program managers and asked whether I could re-budget. I also asked for a supplement on a research grant to NASA because I had unfortunately put in an instrument grant in parallel that … did not make it. The supplement was for a 10K piece of equipment and was necessary for the work.

For a lab in which there are numerous complex instruments to maintain, a highly qualified technician to run the lab day in and day out may be a 'must have.' Respect their expertise, treat them as the partner they are, and

back them up whenever possible. The quality of your science, the quality of your student's graduate experience, and your own sanity will benefit immensely!!

A few (of many possible) logistical tips

Don't underestimate the amount of help and support that your students bring to the task of setting up the lab (including new instruments or specific procedures) or how much they will learn from the effort. They may not be sophisticated analysts when they begin working with you, but motivation is an amazing contributor to success. Also, setting up equipment or new procedures for existing equipment (that is within their intellectual reach) allows opportunity for a lot of hands on learning that is pertinent to a much wider future application than the particular measurement on which a student is focused. They will gain all sorts of insights on experimentation, problem solving, hypothesis development and so on. Appropriately scoped 'set up' projects can be directed for participants at any level, from freshman to post docs. Such projects can be completed as either independent research credit or as a paid position.

Spend time in the lab with the students and then stand back.

Especially if you don't have the luxury of a technician, keep an organized file of your orders. This will make re-ordering consumables much easier!

Create a sacred method book with standard procedures and data templates and require everyone who works in your lab to agree on and follow the same procedures.