Scribe 1

There is the perception that guidance and mentoring takes away from research activity, or it will slow the students down.

Students recognize that professional skills are important – this is evident in surveys of graduate students. Very few feel that the best way to get writing, negotiation, ethics, teamwork, cross-cultural training and other skills is from their advisor. Where are they getting the skills, if anywhere?

Roel Snieder has developed a course and a book, *The Art of Being a Scientist*, from Cambridge University Press. In addition, most universities have centers for professional education. Many times students and faculty don’t know about these resources.

NSF requires ethics training if students/postdocs funded. Does your institution have a content-filled course, or a check-the-box exercise? Actual courses are much more effective.

There are advantages in time savings for faculty: students are more efficient, leading to a smaller workload as a supervisor, increased ability to attract better students, fulfilling funding requirements of agencies, better job placement of students. Also, faculty can hone their skills when they teach classes on these topics.

How do we make the change? It requires behavioral, faculty/student buy-in and resources, and some reward for faculty achievements in mentoring. Leadership has to lead and to espouse the importance of applied research (often considered to be inferior), emotional intelligence, and soft skills.

Joan Frye from NSF asks if anyone partners with business schools to deliver this programming. Roel partners with liberal arts colleagues. Another avenue is that people can propose developing ethics courses to NSF as part of ‘broader impacts.’

Ed Bertschinger (MIT) also suggests using expertise in other departments. There are special opportunities, too, like a physicist-turned-writer. Another outcome could be a course in the art of science writing. Some schools have a professional Master’s program where many of these issues are captured, such as internships and provide skill building. U of Maine has an engineering-business program with online courses. Certificate programs can be useful, too. Clemson has an education certificate.

Colloquia, which are required anyway, allow the possibility to bring back some grad students who are not academics and give students the opportunity to
find out how they succeeded. Reserve a colloquium slot for your graduate student association every quarter or semester, and give the students time to interact with speakers.

Current practices/ideas for add-ons to seminar series: How to do US taxes, ethics, writing and updating CV’s, how to write cover letters, presentation skills, etc.


Does using the term “soft skills” imply that it is a lesser thing that has a lower priority? How to better describe? One alternative is “critical skills”.

Training grad students would like to have: giving talks, writing papers, networking, video and critique of presentations. Some resources might be available from communications or other departments. Some students are self-motivated to seek opportunities for personal development. Others need more direction.

Casey Miller at Univ of South Florida is trying to put together a professional development program, but is having difficulty getting support from above. Can the APS could together a statement about the importance of this?

Ideas/Recommendations to Physics Community:

We suggest a statement from APS that the professional development of our students (and postdocs) should be intentional and not incidental. Administrative support should be provided to develop these critical skills within our student population, and this should be enforced continuously.

A Physics Today article that highlights good programs (carrot).

A shame letter from the APS for people who don’t have any programs (stick).

Things that a faculty members can go back and do:

Introduce training on:

- Communication skills: talking and writing
- Time & project management
- Standardize practice talks for grad students (for conference talks and poster sessions). Could do presentations of grad students’ work annually with prizes.
- Simple changes in colloquia or seminar series to include a broader range of speakers: recent graduates who went to industry, career services, etc. Or have a graduate student lunch talk series run by the students—less pressure.
- External reviews could be used to help emphasize these points.
• Interdepartmental efforts for cost savings. Leverage industrial partners.

Scribe 2

- It is common among physics faculty to discourage students to not waste time on course outside of their program.
- Faculty should be talking to students about what is important to the students and believe it or not, student do understand that the important professionals skills are but they don’t tend to spend the time on learning them without encouragement.
- Getting these professional skills does not come from their advisors, only 10% of (55) student survey report they learn these skills from their advisors.
- Snieder had created a book with resources on professional skills and a curriculum available for use in your department as a model. In it is a list of some of the classes offered at the School of Mines targeting these professional skills.
  - The Art of Science
  - Intro to Research Ethics
  - Fundamentals of College teaching
  - Academic Publishing
  - Professional Oral Communication
  - Advance Science Communication
  - Integrating into Mines Community (with a focus on cross cultural issues)

- Benefits of such classes for the faculty are that the students are more efficient and faculty do not have to spend time editing bad writing all the time. And having the faculty teach a class like this will require the faculty to hone their professional skills as well.
- Challenges: Achieve behavioral change in the department, and not just academic achievement.
- Need student and faculty buy-in. For the School of Mines, the courses just started off with 3-5 students and it took about 10 years to get a class of 60 students.
- Need leadership from the top
- Acquire resources such as time, funding (organization or funding agency)
- Snieder left us with a couple of words to think about
  - A-word: “Applied”
  - E-word: “Emotional Intelligence”
  - S-word: “Soft”

Breakout to the audience

- Are Mines partnering with business schools, English departments or others departments for such an effort? Yes in liberal arts. Team teaching with liberal arts professors.
- NSF is really concerned with ethics training. They’d like to see more of it explicitly. Does NSF support funding for a course like this? Joan Frye says yes, under broader impacts! And this is a good way for departments to hold ownership over their own ethics training for example.
- Adding seven courses to a graduate curriculum is death! In practicality is there other methods? Not every student needs to take all courses, they are one-credit courses and the requirement is to take 3/7 at the School of Mines.
- These courses or the skills delivered in these courses seem to be important for industry too.
- Ed from MIT: These are difficult things to allocate at the department level. At MIT the office of graduate education does all of this but faculty don’t promote it.
- JT from Hopkins: He thinks there could be easy changes maybe even applied at the undergraduate level like writing a CV and cover letter to be tailored for the job they seek.
- Have SPS or graduate student group to reserve a spot in the seminar for industry or professional skill development. An example, How to do your US taxes for foreign students.
- Potvin from Clemson: Suggest not using the word “soft skills” when talking to our departments. Describe it as a critical aspect of our student education that is being ignored.
- Do we have data that this formal training is more effective for students?
- Casey from USF: wants recommendation from APS to require these courses or promotion of these skills as a way to get his departmental buy-in.

Recommendations and Outcomes

- APS statement on professional development of students and post-docs is necessary. It should stress that our students professional development should be intentional and not accidental.
- Administrative support for critical skills should be reinforced
- Small scale changes to seminars and colloquia to broaden their speakers
- Most important skills to work on are time management, communication, presentation practice in core courses
- APS needs to give a signal to departments about the well being and care of their students especially their mental health.
- An explicit request from the APS to enforce a professional development course
- APS or Physics Today to highlight the institutions that are exemplars.