Advice for New Doctoral Advisors

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By Benjamin Braun, Editor-in-Chief, University of Kentucky

It is commonly understood that graduate students need guidance and mentoring, especially as they begin the research phase of their studies with an advisor. A less-frequent topic of discussion is the guidance and mentoring that new doctoral advisors benefit from as they take on this unfamiliar responsibility. For many, if not most, mathematicians working in doctoral-granting departments, training and mentoring in how to be an effective advisor is done in ad hoc and informal ways. As a result, many new doctoral advisors work in some degree of isolation as they develop their advising styles.

In this article, I offer five suggestions for new doctoral advisors, suggestions that I believe make the advising process both more enjoyable and more effective. Knowledge of these suggestions can also be helpful for doctoral students, providing ideas of questions that might be helpful for them to ask their advisors.

1. Ask About Student Career Goals Throughout the Advising Process

It is critical for advisors to respect and support the long-term goals of their students, even when they differ significantly from what the advisor envisions as a successful career in mathematics. The range of career paths for PhD mathematicians is varied and growing, with connections to academia, industry, business, and government [1,9]. Further, the academic job market is in a state of major change and disruption [2,3]. While many graduate students begin their studies with the goal of becoming a faculty member, and while an academic career remains a reasonable goal for many current students, it is important to make sure students are aware of the reality of the mathematical job market and are informed sufficiently to make a purposeful choice about how they want to approach goal-setting.

The best way to handle these important issues is to begin the advising relationship by explicitly asking students about their career goals, discussing a range of possible goals (students do not have to pick only one possible goal!), and helping the students obtain access to any resources they need to pursue them. I

have found it helpful to return to this conversation every 9-12 months, since goals often change as students gain experience and a broader vision of the mathematical community.

The critical ingredient in all of this is for advisors to ask their students a variety of questions to get a solid sense of where students are coming from, and to respond to student ideas (even if they seem undeveloped or naive) without judgement. I have personally found it surprisingly difficult to do this well — I find it reassuring to know that this is a challenge for advisors and supervisors in every field [10].

2. Explicitly Agree on Expectations and Advising Style

Many graduate students do not have a clear idea what to expect from the student/advisor relationship. While I have sometimes heard mathematicians complain about the ill-informed ideas or inexperience of graduate students, *this is not a deficiency on the part of students*. How are graduate students expected to acquire detailed knowledge of the graduate school experience if they are not from families that include academics or doctoral graduates? Further, how is anyone supposed to intuitively understand the expectations of a specific advisor?

It is the responsibility of each doctoral advisor to start a discussion with their students about expectations and advising style, and it is the responsibility of the student to be fully engaged in this discussion. A clarifying framework for conceptualizing advising styles can be found in the work of Gordon B. Davis in his article “Advising and Supervising” [5]. This framework describes advisor and student responsibilities for five styles: Strong master/apprentice style, Collegial master/apprentice style, Collegial development style, Guidance and suggestion style, and Passive Hands-off style. These styles are described in detail in the table provided in the Appendix below, taken from [5, Table 1]. It is reasonable to expect that at the start of the advising period, each advisor and each student will have a preferred style, possibly distinct. It is important that both students and advisors are aware of these preferences and that they are openly and clearly communicated.

It is important to observe that an advising style *does not have to be fixed* for the entire period of graduate study for a student. For example, in my own doctoral advising, I tend to start out in the Collegial Master/Apprentice or Collegial Development style (as described in the Appendix rubric) and shift over time to the Guidance and Suggestion or Passive Hands-Off style as my students mature mathematically. I do not use these phrases exactly with my students; instead, once my students have completed enough mathematical work for a complete thesis, I tell them that they should shift gears and operate more independently, pretending they are a postdoc or new faculty member. I also tell them the goal is to gain some experience in this regard before they officially start one of these roles (so far all of my students have had academic goals).

3. Agree on a (Tentative) Plan and Review it Regularly

Just as it is helpful for tenure-track faculty to have clear expectations regarding their tenure requirements, it is similarly helpful for graduate students to have a sense of the “trajectory” their advisor expects them to have. The best way to achieve this is to lay out a few key goals in a target timeline that is developed in collaboration with the student.

Here is an example of what I would do in one particular situation. Suppose I have a new doctoral student who has completed their written exams by the end of their second year (which is common at my institution), and who has a career goal of getting a job at a teaching-focused academic institution with reasonable but not extensive research/scholarly expectations (this career goal is also common at my institution). In such a situation, I use the following target timeline as a starting point for discussion.

Overall goal	Graduate in May or August of fifth year — I make sure students understand that the reason for this is that at my institution, support is generally given through the end of the sixth year. Thus, in case of delays of any type, e.g. unlucky research setbacks, poor outcome on job market, etc., this provides a "backup" year that can be used if needed.
Fall of third year	Prepare for oral qualifying exam
Spring of third year	Complete oral qualifying exam, begin work on specific research problem (if not already started)
Summer of third year	Consider attending a summer school/program/workshop if any are available
Fall of fourth year	Evaluate research progress, decide if original research problem is leading to adequate progress, change problems if needed
Spring/Summer of fourth year	Have enough research completed to constitute a thesis the following year, write and submit one or two papers prior to beginning job search
Summer of fourth year	Consider attending a summer school/program/workshop if any are available
Fall of fifth year	Focus on job search, continue work on research
Spring of fifth year	Dissertation defense

This particular timeline is not meant to be prescriptive for other new advisors, because it reflects my own advising style, the norms for my institution, the norms for my research area, etc. Rather, this timeline is meant to illustrate the level and depth of planning that I am suggesting is helpful to explicitly discuss with students. Laying out concrete goals (complete oral qualifying exam, complete first research project, etc.) gives graduate students a clear vision of what is expected from them, enabling them to better evaluate their progress through the program. Through revisiting and revising the tentative plan every 8-12 months, with

input from *both* advisor and student, the planning process can be a positive and collaborative experience.

4. Be Mindful of Mental Health Issues and the Culture of Brilliance

As students engage in research and develop as independent scholars, it is normal for them to experience significant self-doubt and psychological setbacks. Unfortunately, these ordinary challenges are often experienced in isolation, or are amplified through a feedback loop in which their academic peers reinforce shared negative feelings instead of providing positive support. Risk of depression and mental illness is unusually high among doctoral students; however, the authors of [11] state that "research on graduate students has also shown that the quality of the advisory relationship is a significant predictor of depressive symptoms." While mental health issues obviously involve many variables that are independent of the actions of advisors, there are concrete steps we can take to positively affect the mental health of our students.

Two of these steps are to set clear expectations and engage in collaborative long-term planning, as described in the previous two sections. As stated in [12] by the authors of [11]:

> *"When people have a clear vision of the future and the path that they are taking, this provides a sense of meaningfulness, progress and control, which should be a protective factor against mental health problems."*

Another step we can take is to explicitly reject the "culture of brilliance" that is frequently found in the mathematics research community [8,13]. I like the following lighthearted but on-point quote from Anne Bruton [4]:

> *"You do not need to be a genius to do a PhD. It certainly helps if you are bright, but some surprisingly unbright people seem to pass. The main characteristic you need in spades is 'stickability' — a 'never give up' attitude, and a willingness to suck up all problems that come your way (and they will), and find solutions to them."*

In mathematics, it is common for researchers to feel that an innate brilliance is required to be successful, even when those same researchers acknowledge that persistence and effort play a critical role. Thus, seemingly innocuous comments about "brilliant" people and "genius" ideas are ordinary and unremarkable in mathematics. In my experience, this leads to a lot of unnecessary self-doubt and loss of self-efficacy on the part of doctoral students. As indicated in [13], this culture of brilliance is also a barrier to having an inclusive and diverse research community. We must actively counter this; it is not sufficient to assume that if "we" don't talk about this, then our students are not impacted by this facet of our culture.

A final step we can take is to show kindness and grace to our students, a topic on which Francis Su has written eloquently (http://mathyawp.blogspot.com/2013/01/the-lesson-of-grace-in-teaching.html) [7].

5. Ask Others for Advice and Resources

Finally, in order to help support our students, it is important that we are supported ourselves. To the greatest extent possible, new doctoral advisors should seek out trusted mentors and colleagues, whether at their own

institution or elsewhere, for advice and suggestions. While some departments have effective mentoring programs, others have few formal support mechanisms in place, and junior faculty can be left in the position of needing to seek out help independently. For any faculty in that situation, reach out to others as much as possible — at every stage of our career, we each benefit from mentoring and support.

Acknowledgements

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Appendix: Rubric of Advising Styles

Style	Advisor Role and Behavior	Student Role and Behavior
Strong master/apprentice style	Advisor is master. Advisor has a well specified domain of expertise and set of problems within it.	Student is an apprentice working for the advisor. Student works on advisor's problems.
Collegial master/apprentice style	Advisor is expert who limits advising to problems that are within scope of his or her research skill set but will work on student's problem.	Student develops a problem within advisor's domain and skills and works under the advisor to develop the research plan and procedures.
Collegial development style	Advisor is senior colleague who will respond to student research problem and extend his or her advising domain to include new problems and new skills.	Student takes initiative to introduce new problem that requires new skill set and works as a junior colleague with advisor in joint development of new domain.
Guidance and suggestion style	Advisor is a senior colleague who gives good general guidance over a wide range of problems and methods but does not have personal skill in all of them.	Student is an independent, junior colleague who takes initiative for presenting problems and research plans for discussion and guidance. Student develops required skills.
Passive hands-off style	Advisor has quality control role and responds only to requests or documents and performs only general quality control review.	Student is an independent researcher who takes initiative for developing problem, developing skills, and presenting research plans for general review and approval.

References

[1] “Math PhD Careers: New Opportunities Emerging Amidst Crisis.” Yuliy Baryshnikov, Lee DeVille, and Richard Laugesen. *Notices of the American Mathematical Society*, Vol 64, No 3, March 2017, pp 260-264 http://www.ams.org/publications/journals/notices/201703/rnoti-p260.pdf (http://www.ams.org/publications/journals/notices/201703/rnoti-p260.pdf)

[2] “Survey on Math PostDocs.” Amy Cohen, Letter to the Editor, *Notices of the American Mathematical Society*, Vol 64, No 6, June/July 2017, pp 541 http://www.ams.org/publications/journals/notices/201706/rnoti-p540.pdf (http://www.ams.org/publications/journals/notices/201706/rnoti-p540.pdf)

[3] “Disruptions of the Academic Math Employment Market.” Amy Cohen. *Notices of the American Mathematical Society*, Vol 63, No 9, October 2016, pp 1057-1060 http://www.ams.org/journals/notices/201609/rnoti-p1057.pdf (http://www.ams.org/journals/notices/201609/rnoti-p1057.pdf)

[4] “Dear new PhD student — a letter from your supervisor.” Anne Bruton. Weblog, https://anniebruton.wordpress.com/2013/09/21/dear-new-phd-student/ (https://anniebruton.wordpress.com/2013/09/21/dear-new-phd-student/) Retrieved 19 December 2017.

[5] “Advising and Supervising.” Gordon B. Davis. In *Research in Information Systems: A handbook for research supervisors and their students.* Butterworth-Heinemann, 2005. Preprint at http://misrc.umn.edu/workingpapers/fullpapers/2004/0412_052404.pdf (http://misrc.umn.edu/workingpapers/fullpapers/2004/0412_052404.pdf)

[6] “Advice to a Young Mathematician.” Sir Michael Atiyah, Bela Bollobas, Alain Connes, Dusa McDuff, and Peter Sarnak. In *The Princeton Companion to Mathematics*, Ed. Timothy Gowers. Princeton University Press, 2008. http://assets.press.princeton.edu/chapters//gowers/gowers_VIII_6.pdf (http://assets.press.princeton.edu/chapters//gowers/gowers_VIII_6.pdf)

[7] “The Lesson of Grace in Teaching.” Francis Su. Weblog, http://mathyawp.blogspot.com/2013/01/the-lesson-of-grace-in-teaching.html (http://mathyawp.blogspot.com/2013/01/the-lesson-of-grace-in-teaching.html) Retrieved 22 December 2017.

[8] “Belief that some fields require ‘brilliance’ may keep women out.” Rachel Bernstein. *www.sciencemag.org*, 15 Jan 2015. http://www.sciencemag.org/news/2015/01/belief-some-fields-require-brilliance-may-keep-women-out (http://www.sciencemag.org/news/2015/01/belief-some-fields-require-brilliance-may-keep-women-out) Retrieved 22 December 2017.

[9] National Research Council. *The Mathematical Sciences in 2025*. Washington, DC: The National Academies Press, 2013. http://www.nap.edu/catalog/15269/the-mathematical-sciences-in-2025 (http://www.nap.edu/catalog/15269/the-mathematical-sciences-in-2025)

[10] *Humble Inquiry: The Gentle Art of Asking Instead of Telling*. Edgar H. Schein. Berrett-Koehler Publishers. 2013.

[11] “Work organization and mental health problems in PhD students.” Katia Levecque, Frederik Anseel, Alain De Beuckelaer, Johan Van der Heyden, Lydia Gisle. In *Research Policy,* Volume 46, Issue 4, 2017, Pages 868-879, ISSN 0048-7333. http://www.sciencedirect.com/science/article/pii/S0048733317300422 (http://www.sciencedirect.com/science/article/pii/S0048733317300422)

[12] “Ph.D. students face significant mental health challenges.” Elisabeth Pain. *www.sciencemag.org*, 4 April 2017. http://www.sciencemag.org/careers/2017/04/phd-students-face-significant-mental-health-challenges (http://www.sciencemag.org/careers/2017/04/phd-students-face-significant-mental-health-challenges) Retrieved 24 December 2017.

[13] “Expectations of brilliance underlie gender distributions across academic disciplines.” Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer, and Edward Freeland. *Science*, Vol. 347, Issue 6219, pp. 262-265. http://science.sciencemag.org/content/347/6219/262 (http://science.sciencemag.org/content/347/6219/262)

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Joe Silverman *says:*

January 9, 2018 at 8:10 pm (https://blogs.ams.org/matheducation/2018/01/08/advice-for-new-doctoral-advisors/#comment-614)

There have a been a couple of workshops entitled “Mentoring Workshop for Graduate Advisors in Mathematics,” one at Tufts in 2015 and one at U Michigan in 2017. There may be more planned. Moon Duchin, Larry Guth, and Sarah Koch were the organizers. Here are links to the conference pages:

http://mduchin.math.tufts.edu/mwgam/
http://www-personal.umich.edu/~kochsc/workshop.html

Maybe there will be another one in 2019? Also, I had thought that some of the material/outcomes were going to be posted online, but that doesn’t appear to have happened (yet).

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