

How to Grow Your Graduate Students: Mentoring Tips for New Professors

Julie L. P. Jessop
University of Iowa

Abstract

In the College of Engineering at the University of Iowa, tenure-track assistant professors are evaluated on their “effectiveness in directing undergraduate, M.S., and Ph.D. research to completion.” This statement assumes that, along the students’ paths to degree completion, the faculty adviser has engaged them in effective mentoring relationships. Unfortunately, good mentoring skills are not innate, and the average assistant professor has had little or no training in these skills prior to accepting a tenure-track position. How then does a new professor, whose time, resources and energy are at a premium, successfully mentor their graduate students so as to cultivate productive, competent members of the scientific community? Here, mentoring tips from various resources are shared, along with personal mentoring experiences.

Introduction

Taking on graduate students as a new assistant professor is akin to adopting a child. You do not have the benefit of starting at square one—the child has been molded by others before you, and you have not developed parenting skills along the way. There is one big difference of course—you cannot and should not play the parent to your graduate students (you are all adults after all). So, how do you navigate this budding relationship to help your students grow into the scientific professionals of tomorrow? The Committee on Science, Engineering, and Public Policy has published an excellent resource on mentoring that includes a top-ten list of mentoring tips for new assistant professors:¹

1. Listen patiently
2. Build a relationship
3. Don’t abuse your authority
4. Nurture self-sufficiency
5. Establish “protected time” together
6. Share yourself
7. Provide introductions
8. Be constructive
9. Don’t be overbearing
10. Find your own mentors

Each of these tips touches on an essential aspect of the mentoring relationship. This paper presents practical applications of this advice in defining expectations in the mentoring

relationship, defining the roles of a faculty adviser, developing a healthy mentoring style, building support structures, and building a mentoring environment. It also provides a list of resources for further mentoring strategies.

Defining expectations in the mentoring relationship

It is extremely important to set the ground rules in a mentoring relationship. There must be a dialogue to determine what the student expects of you as the adviser and what you expect of them as the student. Too often, this understanding is not verbally expressed, which leads to much frustration and disappointment when others do not live up to the unwritten expectations we have placed on them. One of the biggest frustrations may be avoided by recognizing the following:

Rule #1: Don't expect your graduate student to be just like you were as a graduate student.

Each student comes with different strengths, weaknesses, background, and priorities. As a mentor, it is important to recognize this so that you can define who they are and how best to interact with them. Taking time to listen to the student and building this relationship carefully (Tips #1 and #2 above) play an important part of this definition process. When a new student enters my research group, I conduct a "mentoring interview" to learn about their career goals, prior experience, preferred management style, *etc.* Villarruel provides a helpful list of questions for this interview, examples of which are listed below:²

- What are your strengths? Tell me about the things that you believe you do well.
- How important is it to you that you and I be friends?
- Tell me about your career plans. What do you want to be doing five years from now? Ten years from now?
- What are your expectations with respect to this mentoring relationship? What do you expect from me? What do you think I expect from you?
- Do you prefer to work and plan as we go, or have the plan worked out in detail before we begin?

Based on this interview, I can develop a mentoring plan that is tailored to each student. If the student wishes to pursue a career in industry, I can begin looking for an appropriate summer internship; if the student wishes to pursue an academic position, I can send them to teaching workshops. This is also the time to let the student know my mentoring style. For instance, I prefer to have a more traditional professional relationship with my graduate students, so an expectation of a "buddy" mentor would not be realized.

Defining roles of a faculty adviser

A faculty adviser is much more than just a research supervisor to their graduate students. The adviser is the key player in shaping the educational experience, personal and professional development, and networking capacity of the graduate student. *Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering* devotes a chapter to each of

the mentoring roles a faculty adviser is expected to fulfill.¹ In their capacity as faculty adviser, a mentor develops a plan of coursework and facilitates a research project for the graduate student. As a career adviser, the mentor helps the student prepare for a career and introduces them to their own network of professional contacts (Tip #7). As a skills consultant, the mentor helps them hone their communication skills (written and oral) and provides them with opportunities to develop their teaching and proposal writing skills (which are relevant to industrial jobs as well as academic). Finally, as a role model, the mentor shares with the graduate student the various aspects of their job, both good and bad, so that the student can evaluate their own career choices and preparation (Tip #6).

The central goal uniting the various roles of the faculty adviser is to help the student become self-sufficient (Tip #4). This process of facilitating growth from student to colleague is detailed in *The Mentor's Guide*.³ Here, Zachary suggests that the seasons of a mentoring relationship begin with tilling, where mentors prepare themselves by assessing their motivations and skills and by defining roles and expectations of the mentoring relationship. In the planting phase, the faculty adviser and graduate student negotiate the outcome and process of the relationship (*e.g.*, goals, boundaries, and work plan). The bulk of the time and energy in a mentoring relationship are spent in the nurturing phase in which the faculty adviser provides support, offers challenges, and supplies a vision to the graduate student. Finally, the mentoring relationship should come to closure in the season of reaping: the graduation and gainful employment of the student within the scientific community.

In the Chemical & Biochemical Engineering Department at the University of Iowa, the mentor's role as skills consultant is facilitated through a graduate core course entitled "Introduction to Literature Review & Proposal Writing."^{4,5} The course covers a wide variety of topics that the students will find necessary in their graduate education (and beyond), such as generation of research ideas, literature and citation searches, presentation skills, publication evaluation, writing mechanics, and research ethics. Since all first-year students take the course, the faculty advisers know that the students have the same basic understanding and competency in this skill set. It also provides the faculty adviser with an idea of the student's strengths and weaknesses in these skills so that they can facilitate improvements throughout the remainder of their graduate education. Finally, the course promotes early interaction between the students and their mentors on their research projects, which leads to more productivity in a shorter period of time.

Developing a healthy mentoring style

There is no single right way to mentor, and there are many ways to exhibit mentoring skills. The key is to choose what works best for you AND your student. Because each student responds differently, it is important to recognize:

Corollary #1: Be flexible in your mentoring style.

Just as students cannot be expected to be carbon copies of their mentors (Rule #1), they also should not be mentored exactly the same. For example, some students can be left to their own devices; some students need more supervision and prodding. Failure to acknowledge these differences can lead to frustrated students who feel micromanaged (in the first case) or lost and

alone (in the second case). Goleman explores several leadership styles (see Table 1), both resonant (in tune emotionally) and dissonant (out of tune emotionally), and remarks that the best leaders can display four or more styles depending on the situation.⁶ This can be applied to successful mentoring as well. Each student may require a different style combination: the goal is to choose the mentoring style(s) that will help the student stay in the zone of their optimal performance. Although it is most desirable to use the resonant styles, there may be times when the dissonant styles are necessary (e.g., when a student is underachieving). However, the dissonant styles can be harmful in a learning relationship such as mentoring and should be used carefully and sparingly.

Table 1. Goleman’s Leadership Styles⁶

Resonant Leadership Styles	Dissonant Leadership Styles
1. Visionary : provides long-term direction and vision	1. Pacesetting : pushes to accomplish tasks
2. Coaching : develops employees for long-term	2. Commanding : demands compliance
3. Affiliative : creates harmony in work relationships	
4. Democratic : builds commitment through collaborations	

Unhealthy mentoring styles,⁷ on the other hand, should be avoided entirely. Examples include mentors who are not accessible to their students (“avoiders”), mentors who give their students tasks without appropriate preparation or support (“dumpers”), mentors who micromanage their students or prevent them from succeeding (“blockers”), and mentors who only offer negative feedback (“destroyers”). Tips 3, 5, 8, and 9 warn against such behaviors.

Building support structures

It is of utmost importance that new assistant professors realize that they are not alone in the mentoring process of their graduate students. Mentoring support structures for both the faculty adviser and their students can be erected to lessen the mentoring responsibilities and improve the mentoring experience for all. First, new assistant professors should not hesitate to ask more experienced faculty advisers for advice (Tip #10). Selecting more than one “mentoring mentor” is important because you can gather a full spectrum of advice and be able to follow what fits your mentoring style best. Second, there are numerous mentoring resources available in print. In addition to the books and articles mentioned here, there are several excellent books to help new assistant professors in all aspects of their position; I indicate the specific chapters dealing with graduate student mentoring below:

P.C. Wankat, “Chapter 9: Graduate Students and Graduate Programs,” *The Effective, Efficient Professor: Teaching, Scholarship and Service*, Allyn and Bacon: Boston, 2002.

K. Barker, “Mentor to All?,” *At the Helm: A Laboratory Navigator*, Cold Spring Harbor Laboratory Press: Cold Spring Harbor, NY, 2002.

C.I. Davidson and S.A. Ambrose, “Chapter 7: Supervising Graduate Research,” *The New Professor’s Handbook*, Anker Publishing Company, Inc.: Bolton, MA, 1994.

Third, new assistant professors should encourage their students to find more than one mentor (Tip #7). No one person can fill all the mentoring needs of a single student. Other mentoring resources for students include members of their graduate committee, industrial research sponsors, post-doctoral research associates, *etc.* Another effective method of extending the mentoring network of graduate students is to hold joint group meetings with other research groups. For example, my research group participates in a combined photopolymerization group meeting, which incorporates four research groups. I have found this especially helpful because now my group of three students has a much larger pool of people with whom to interact. As a new assistant professor, I function as the “senior graduate student” for my students in many ways: teaching them how to use equipment, analyze data, navigate the office paperwork, *etc.* However, now my students can learn some of these skills by working with students in these established research groups, which frees up time for me to focus on proposal and paper writing. My students can also see more senior students present research, which helps them envision the competencies for which they should strive and helps them broaden their understanding of the research field. Finally, I benefit by receiving mentoring assistance from the other professors, who are observing my students in the group setting.

Building a mentoring environment

Mentoring moments may be accomplished informally; however, it is important to designate a regular meeting time with graduate students to assess their progress toward goal achievement (Tip #5). I have implemented weekly one-on-one meetings with my students to review their research progress. Before each meeting, they submit a weekly progress report (see Table 2) that forms the basis of our discussion. The format that I developed helps me address several mentoring issues that have arisen in my research group. Since my group contains international students, this format gives them the opportunity to practice their written communication skills

Table 2. Example of Weekly Progress Report

Name:	
Date:	
Activity	Time on Task*
* Estimate to nearest half hour	
Significant Results	
Research Plan for Coming Week	
Questions and/or Comments	
___ Data analysis appended to report	

and allows me to give them timely feedback. “Time on task” is included so that I can help them with time and priority management. By summarizing their results each week, students are able to see their progress compared to the established work plan. A week-by-week research plan is also useful for keeping the students on task. The student and I go through the plan from the previous week to discuss the status of each point (*i.e.*, was it done and what was the outcome?). The current week’s plan forms an agreement of research expectations. The “Questions and/or Comments” section allows me to address problems and concerns promptly, both in regards to laboratory equipment and experimental technique. Finally, the students are expected to begin data analysis and provide this in a clear,

concise format. This gives them practice in interpretation and presentation. We then use this information to evaluate research hypotheses and revise the research plan and goals as needed. I have found this meeting time to be an excellent way to facilitate communication between my students and me, as well as to fulfill my expected roles as faculty adviser and skills consultant.

Conclusion

Growing graduate students into respected colleagues requires significant amounts of time and energy—it does not occur spontaneously. New assistant professors can improve their mentoring relationships by (1) setting realistic expectations for themselves and their students, (2) understanding the characteristics of healthy mentoring roles and relationships, (3) developing flexible mentoring styles to accommodate the needs of different students, (4) taking advantage of other mentoring resources for themselves and encouraging their students to seek out additional mentors, and (5) establishing regularly scheduled meetings to focus on their students and track their progress.

1. Committee on Science, Engineering, and Public Policy, *Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering*, National Academy Press: Washington, D.C., 1997. <<http://www.nap.edu/openbook/0309063639/html/R1.html>>
2. F.A. Villarruel, “Establishing a Good Mentoring Relationship,” *Research Integrity*, **3**(2), 1999. <<http://www.msu.edu/user/gradschl/all/ris99.pdf>>
3. L.J. Zachary, *The Mentor’s Guide*, Jossey-Bass: San Francisco, CA, 2000.
4. J.L.P. Jessop, “Helping Our International Students Succeed in Communication,” *American Society for Engineering Education 2002 National Conference Proceedings*, 2002. <http://www.asee.org/conferences/caps/document2/2002-921_Paper.pdf>
5. J.L.P. Jessop, “Expanding Our Students’ Brainpower: Idea Generation and Critical Thinking Skills,” *American Society for Engineering Education 2002 National Conference Proceedings*, 2002. <http://www.asee.org/conferences/caps/document2/2002-947_Paper.pdf>
6. D. Goleman, “Realizing the Leadership Power of Emotional Intelligence,” *The Leadership Summit 2002: The Sky-High Stakes of Leadership*, Barrington, IL, August 8, 2002.
7. J. Reyes, “What a Tangled Web We Weave,” *Research Integrity*, **3**(2), 1999. <<http://www.msu.edu/user/gradschl/all/ris99.pdf>>

JULIE L. P. JESSOP

Julie Jessop is an Assistant Professor of Chemical and Biochemical Engineering at the University of Iowa. She is actively involved in polymer research and teaches a series of polymer courses in addition to an “Introduction to Literature Review and Proposal Writing” course for first-year graduate students. She received her Ph.D. in chemical engineering from Michigan State University.